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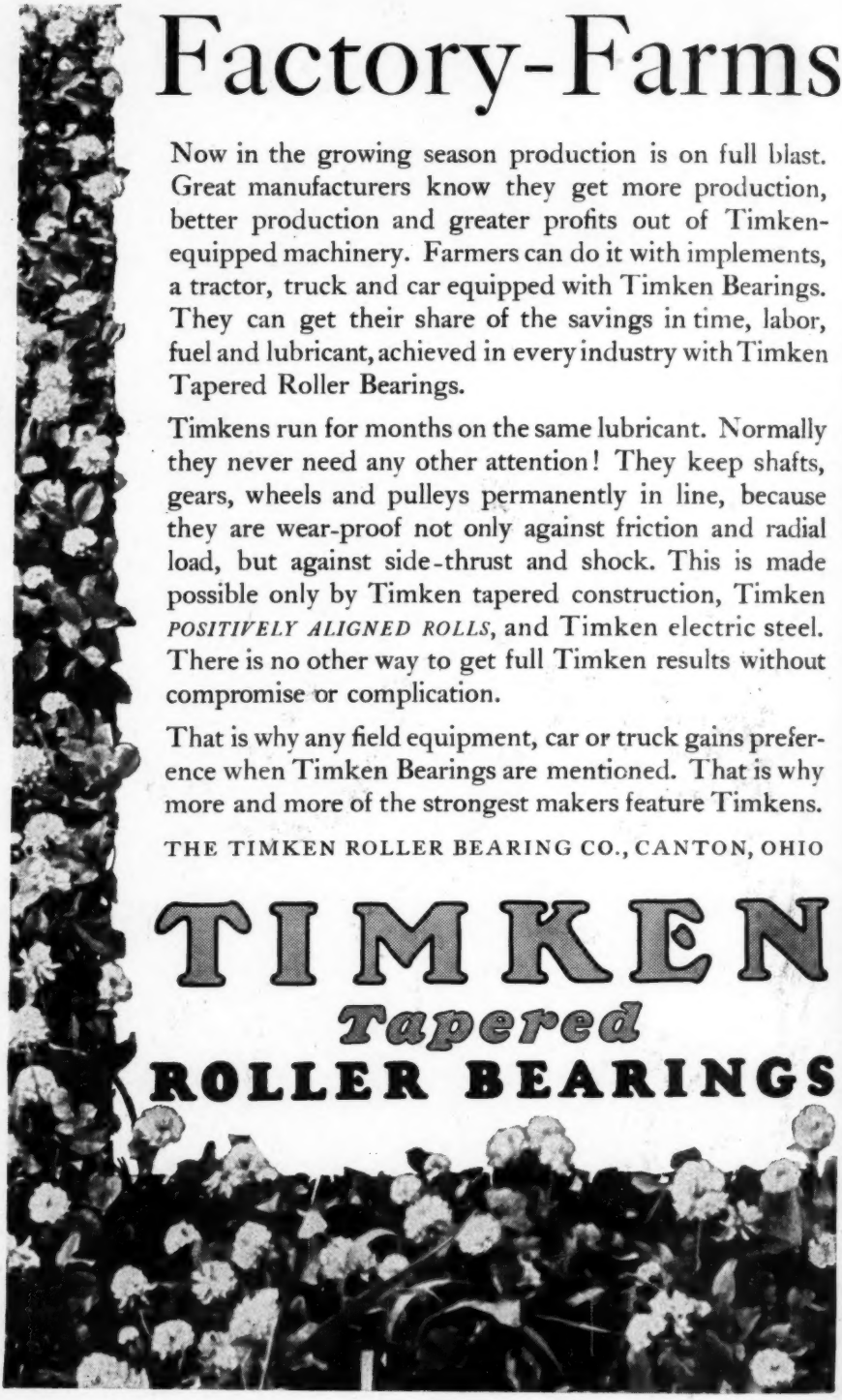

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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
Editorial Offices: 19 West 44th Street, New York.

VOLUME X NUMBER SEVEN

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Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER

Prim little scholars are the flowers of her garden,
Trained to stand in rows, and asking if they please.

—GEORGE MEREDITH.

Better Crops with Plant Food

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This is the season for baby kissing and —

Politics

By Jeff McDermid

WHEN I have the time, I feel sorry for politicians. The dew of my charity falls alike upon those who win and those who also ran. Perhaps they have my sympathy because politicians and editors have much the same professional problems.

Both are trying hard to hit upon something potent enough to overcome individual initiative or commercial competition and produce a public spirited souse, if that term may be used. It usually requires a stiff brand of contraband elixir to do it.

The politician is really worse off in that respect than the editor. The editor may dip into race prejudice, religious argument, motion picture divorces, or companionate marriage. He may enjoy himself as thoroughly explaining to the advertising agency as he used to in avoiding the horsewhip. He may arouse the Vox Poppers and stampede the Pro Bono Publicos for a temporary tilt at modern windmills and scandalous oil-wells, and he may succeed in having a few old ladies cancel their subscriptions. The editor is also more independent than the politician in one sense, for he doesn't have to kiss *all* the babies. The politician dares not discriminate. You can stop a paper but you can't stop an election.

The politician may have the frank-

ing privilege, but he does not feel privileged to be frank. Frank expression (meaning free thinking right out loud) used to be held up as a virtue. Strange to say, however, I doubt if those who received the full benefit of somebody's utter frankness ever loved the one who possessed that alleged virtue. This business of being absolutely disinterested and truthful on every little occasion is a virtue that lies in the questionable twilight zone of ethics. Many a white lie has staved off a black look.

NOW the entrance of frail woman into the political arena or the gallery has only emphasized the politician's determination to avoid frankness. When there arrives a new influx of voters who have been taught that evasion is etiquette and frankness is folly, where is the sane campaigner who is going to be painfully truthful?

The modern candidate must be candied, but never candid. Even Honest Abe said, "You can catch more flies with molasses than you can with vinegar."

Back before the Nineteenth Amendment, the jocular opponents of female balloting used to roar out that old bon mot, "Hurrah for women suffrage; let 'em suffer!" Hence now we find them suffering alongside the male electors—suffering from the same ailment of inertia and indifference to public questions that has made the twentieth century an epoch of political bluster on so many occasions.

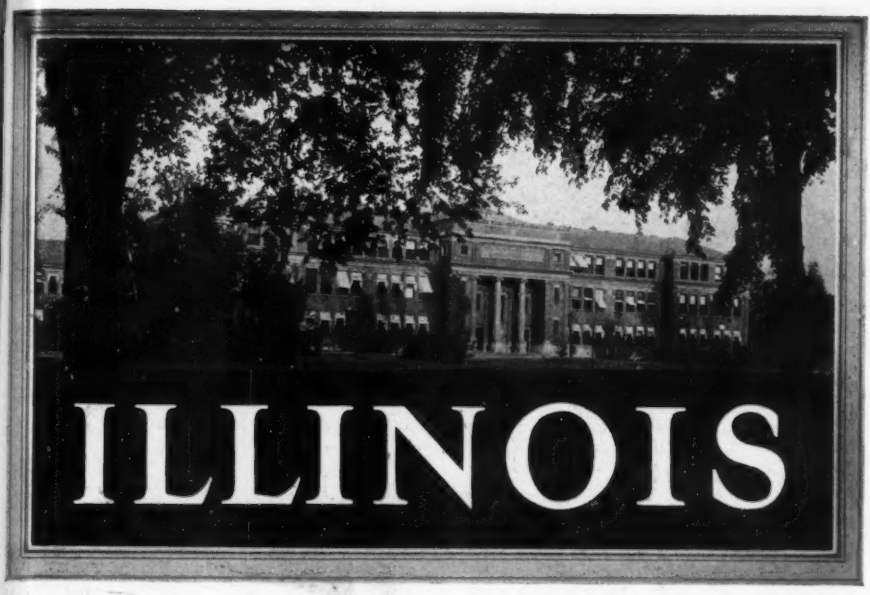
Not more than one-third to one-half of the qualified electors of America take part in the presidential ballot. When a local issue becomes tinged with long, red whiskers and nitro bombs, the lethargy of the voters is sometimes shaken so that perhaps seventy per cent of them vote more or less intelligently. When there is the thrill of a Gatling gun or a riot in the air, some folks realize that we have a government. I believe that if we passed a Twentieth Amendment making it a misdemeanor to read political news or a felony to be caught near the polls, we would roll up a bootleg vote large enough to preserve our electoral quorum.

Personally, I am accustomed to our national laxity in respect to political economy—or any kind of economy in these days. I am myself one of the dozed and befogged proletariat, and I still have sense enough to squawk about it.

MY youth came at the close of the gilded age of campaign eclat. I recall with fervid joy those ragamuffin parades, the proud torchlight marchers, and the rattling brewery wagons transformed into floating bulwarks of liberty through the magic of paper flowers, bunting, and the eerie spell of a summer night. I can yet see the climax of the spectacle, when the orator of the evening rode by us in an open hack, surrounded by my envied chums each bearing aloft a flickering transparency. The slogans on those placards were as familiar to the voters as "chaw raw beef" and "so deep" were to the swimming hole gang.

Gone are the sires who spent their evenings, and possibly soldiered on the job, to debate free silver, imperialism, the Dingley tariff, and civil service reform. Gone are the grandsires who were blind to every consideration except to "vote the same way they fit!" Gone are the young men's parliaments where the platforms of the principal parties were the targets of callow opinions. Gone are the cracker-barrel lyceums around the base-burners with their mixed

(*Turn to Page* 61)



ILLINOIS

By F. J. Keilholz

Extension Editor, Illinois Agricultural Experiment Station

¶ Our twenty-sixth experiment station story

BORN in poverty, the Illinois Agricultural Experiment Station had to make good from the start or perish. Its vigorous, healthy condition at the mature age of 40 years, therefore, seems evidence enough that it has come through.

Financial poverty as well as a poverty of farmer faith engulfed the mother institution, the University of Illinois, when the prairie state experiment station came into being on March 21, 1888, under the provisions of the Hatch Act. Those who know the University of Illinois as it is today find it hard to imagine that it ever saw years of depression.

Faith of the farmers in the University had been shattered in 1885 by the change from the name Illinois Industrial University. An old ex-trustee, a large farmer, told one of the professors that he now gave the University up—the industrial classes had lost it. Lamentation of the agriculturists was for a time great. The Iowa Homestead concluded that the sensibilities of the dude students were now cushioned, and that it only remained to substitute for the motto, "Learning and Labor," the words, "Lavender and Lily White."

As if to meet this challenge, the experiment station has developed a program to match the wide diversity in the farming interests of the state. Today there is not a tiller of the soil from the rose rower of the Chicago district to the combine user of the central Illinois grain belt who is not benefited by the work of the institution. A staff of 138 specialists is employed, while orchards, experimental plots, feed lots, and separate farms of the station and college cover in the neighborhood of 2,000 acres. Twenty-eight buildings now dot the experimental farms at Urbana. Purebred flocks and herds of the representative breeds and classes of livestock are maintained. Something of the quality of this livestock can be judged from the fact that 77 head of cattle, sheep, hogs, and horses entered in the 1927 Chicago International Livestock Exposition came home with a total of 42

The new Agricultural Building.

awards won in competition with the best in Canada and the United States. More than 300 different bulletins and 374 circulars have been published on different phases of improved farming, while 39 county soil reports already have been distributed. There are at present 258 separate and distinct projects under way in the station's work.

Enough wealth has been realized by the state of Illinois from the results and teachings of the station's investigations to cover, many times over, the cost of the entire university, and that means millions of dollars.

The Illinois station has, for one thing, led the world in corn breeding. It was here the discovery was first made that the composition of corn could be markedly changed at will by breeding. At the time these experiments were undertaken, an increase of only one pound a bushel in the oil content of corn would have increased its value 5 cents a bushel to the glucose manufacturers. Many of the economic conditions which prompted the experiment have changed or eliminated its practical applications, but nevertheless the work will stand for all time as a demonstration of how the composition of the corn grain may be altered by breeding.

Value of Utility Score

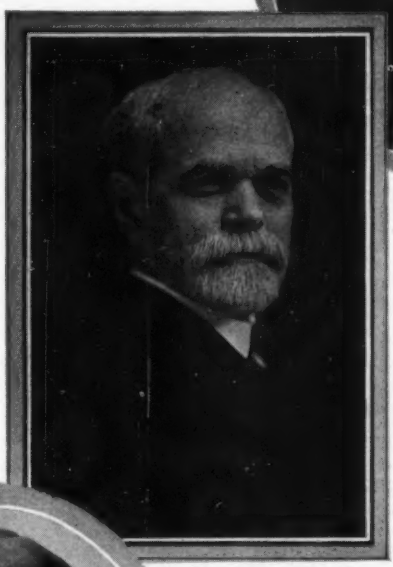
The experiment, which has since been changed to a study of how certain physical and chemical characters of the corn plant are affected by selection, has now been going 32 years. The highest average percentage of protein in the history of the experiment was found in the 1927 crop of the High Protein strain. Likewise, the greatest difference between the High Oil and the Low Oil strains was obtained in 1927. In other words, selection for high and low composition of oil and protein in corn is still effective after more than 30 years.

Corn from the High Protein strain averaged 18.45 per cent protein, as compared with 7.23 per cent for the Low Protein strain. This was a dif-

ference of 11.22 per cent. The 1927 crop of the High Oil strain averaged 10.85 per cent, the highest average ever obtained, and the Low Oil ears averaged 1.42 per cent, the lowest average ever. This made a difference of 9.43 per cent. The High Oil strain thus contained 7.6 times as much oil as the Low Oil strain. Height of the ears in the High Ear and the Low Ear strains was 120.5 inches and 8.1 inches, respectively, for the 1927 crop. Counts on the Two Ear strain showed that 80.1 per cent of the stalks bore two or more ears.

One of the decidedly practical things that has come out of the Illinois station's researches on corn breeding and corn diseases is the score card for utility type corn. Before the utility type score card was set up, the ideal ear of corn frequently proved a disappointing parent. Many times a sample placed high in the show room proved to be inferior to a very ordinary looking sample when the two were tested in the field. Researches at the Illinois station and by other investigators disclosed a whole group of fungous and bacterial diseases of corn. It is now recognized that the root, stalk, ear, and cob rot diseases of corn are one of the greatest stumbling blocks in the way of more efficient corn production. These diseases are now known to cost Illinois corn growers millions of dollars every year.

Dean and Director H. M. Mumford.



Dean and Professor Emeritus Eugene Davenport

LEFT: Dr. W. L. Burlison, Head of the Agronomy Department

Farmers who culled their seed corn to the disease-resistant, Utility-type standard as advocated in the state-wide better seed corn project of the Illinois extension service last year reported added yields of as much as 12 bushels an acre.

In 1924, the Illinois station summarized its seven years of research

work on corn disease problems in the form of Bulletin 225 and this publication immediately became the text book from which Illinois farmers were to get their information regarding corn production.

One of the more recent station investigations benefiting Illinois' $300,000,000 corn crop is the work on the treatment of seed corn with chemicals for the control of the seed-borne corn rot diseases. This work has been done in cooperation with the federal department of agriculture. It has been found that treatments with chemicals costing at the rate of only three cents an acre will control certain of the diseases and thus save at least part of the heavy toll now being taken by diseased and disease-susceptible seed. Results of the tests are considered conclusive enough to warrant the practice of seed corn treatment being recommended to farmers.

A $20,000,000 Increase

Within the 41 years that the Illinois experiment station has been in existence, the average yield of corn in the state has increased from about 31 bushels an acre to more than 36 bushels an acre, certainly at least partly as a result of the investigations which have been carried on with varieties, cultivation, fertlization, and disease control. As early as 1908, the station was able to report that the value of the corn crop had been increased an average of $20,000,000 annually since 1901.

Crops investigations of the Illinois station have yielded their full share of new and improved varieties of the different grains. It would be hard to calculate what two of these, the Illini strain of soybeans and Turkey Red 10-110 wheat, alone mean to the state that leads in soybean production and is second in wheat production. The new soybean, Illini, has been one of the highest yielders of seed during the five years or more that it has been tested on the station farm. It also has shown a comparatively high percentage of oil. Fame of the new strain has become so widespread that hundreds of acres of it were planted in the state during the 1928 season. The Turkey Red 10-110 strain of wheat developed by the station plant breeders

BELOW: The corn breeding experiment that has led the world. Originally this High Ear strain and Low Ear strain came from the same parent stock and the difference shown in the picture is the result of long years of breeding and selection.

ABOVE: Sir John Russell, director of the Rothamsted Experiment Station of England where the world's oldest plots are located, looking over the historic Morrow plots with Director Mumford on a recent visit to the United States.

Director Mumford and five of his department heads. Left to right: H. P. Rusk, animal husbandry; H. A. Ruehe, dairy; E. W. Lehmann, farm mechanics; F. H. Rankin, agricultural college extension; H. C. M. Case, farm organization and management, and Director Mumford.

likewise is a high-yielding one that has become popular.

America's oldest soil experiment plots, the Morrow plots of the Illinois agricultural experiment station, have been characterized as a monument marking the tragedy of soil exhaustion in this country. The history and record of these plots are the reward for foresight which enabled early investigators of the college to see across a half century and then patiently and painstakingly set about securing the facts likely to be needed at that time. The plots were started 53 years ago and named after George E. Morrow, professor of agriculture from 1876 to 1894.

The investigations were designed to compare the effects of a single crop system as against more diversified systems of farming. Three systems of cropping have now been under way for more than half a century: (1) continuous corn, (2) a corn and oats rotation, and (3) a corn, oats, and clover rotation. Since 1904, one-half of each system has been treated with manure, limestone, and phosphate. In addition, the two rotation systems during recent years have had the benefit of a green manure sweet clover crop.

Results for the 12-year period ending with the crop of 1927 show that crop rotation alone increased the yield of corn 88 per cent, soil treatment alone 76 per cent, and when the two were combined, the yield of corn went up 177 per cent.

Influential Factors

Value of crop rotation and soil treatment is reflected in the average annual acre value of the different crops during the 12-year period ending in 1927. Without soil treatment this value was $15.89 in the case of the continuous corn, $17.39 in the case of the corn-oats rotation, and $24.35 in the case of the corn-oats-clover. Under the system of soil treatment with manure, limestone, and phosphate, the average annual acre value of the crops in the case of the continuous corn was $20.94, for the corn-oats rotation $26.71, and for the corn-oats-clover rotation $34.49.

Thus crop rotation and soil treat-

ment both have proved to be factors which influence crop yields to a marked degree. Crop rotation without soil treatment boosted the financial returns a little more than 50 per cent, while the two combined more than doubled the net returns.

It remained for the Illinois Agricultural Experiment Station to discover the general absence from Illinois soils of the alfalfa bacteria, without which this greatest of all forage crops cannot be successfully grown; that bacteria of the common rank-growing sweet clover could be used for alfalfa inoculation; that limestone was needed on the acid soils before the nitrogen gathering bacteria could live and flourish on the roots of the leguminous plants. Illinois now ranks high in the production of alfalfa with an acreage of 234,000 acres in 1927.

The now universal shallow cultivation of corn instead of deep cultivation is the result of a long series of carefully conducted experiments at the Illinois station along about 1898. These studies were the first to establish the fact that, as an average, nearly five bushels more corn an acre could be produced by shallow cultivation than by the deep cultivation then in vogue, a finding which in itself has meant millions of dollars not only to the farmers of Illinois but also all those who grow corn.

Another preconceived notion that the Illinois investigations early upset, to the profit of the state's farmers, was that the so-called hard pan lands of middle southern Illinois could not be underdrained. The station not only demonstrated that this was possible but also showed that it could be easily done, thus increasing the yield of the commonly grown crops 25 per cent.

Perhaps the quickest results which the Illinois station got in its early studies of various soil problems came in the investigations of peaty swamp soils, found to be lacking in potash. Such lands are especially abundant in three different counties of the state and in most counties adjoining these three. Through soil analysis and the use of soil experiment fields maintained in those sections of the state, the station soon discovered the difficulty and demonstrated a practical remedy. As early as 1908 it was reported that the net profits then being secured annually from the use of potash on these soils was far above the total annual cost of all soil investigations for the state.

Likewise, it was later found that 310,000 acres of Illinois sand land, usually considered waste, could be made to yield almost as well as corn belt soil through treatment with limestone and sweet clover green manure.

Permanent Fertility System

Premier among the Illinois station work of long-time application and benefit is that which led to the working out of a system of permanent soil fertility for the state. It was the late Dr. Cyril G. Hopkins who for 25 years devoted himself untiringly to furthering this work. Essentials of the system are the addition of limestone, phosphate, and manure and the rotation of crops to include legumes.

How well the system has taken with farmers of the state can be judged from the fact that as far back as 20 years ago Illinois was using more ground limestone and rock phosphate than all the other states combined and is still one of the leading states in the use of these materials. Significantly enough, the first carload of these materials ever applied in Illinois was used on the experiment station fields.

Strengthening evidence of the soundness of this system is being piled up every year in continued investigations by the agronomy department. For instance, during the rotation period ending in 1927 limestone added $4.55 to the annual acre income from the dark-colored soils of the corn belt, when it was applied in addition to farm manure, and $6.12 when it was used in connection with sweet clover. On the light-colored soils of southern

(*Turn to Page 55*)

Retail Curb Market, Wilmington, Delaware.

America's Markets

NUMBER VI: *What's the Answer?*

By Frank George

U. S. Department of Agriculture

PUBLIC and private agricultural agencies for years have tussled with the so-called "marketing problem." Millions of dollars have been spent in investigation of its various phases. Millions of newspaper and farm journal columns have been devoted to its consideration. It has caused many a political upset. And yet, it is more of a problem today than ever before. Perhaps it is like the poor.

The cost of distributing farm products in the United States has practically doubled since pre-war, and is approximately 50 per cent higher than in 1917, according to a recent study by Dr. G. F. Warren and Dr. F. A. Pearson of Cornell University. The cost has risen steadily in the last three years. Farmers in the five-year pre-war period received 51 cents of the consumer's dollar as applied to 10 major farm products, whereas they now receive only 45 cents. The range of percentage of retail prices received by farmers in 1927 was from 21 cents

of the consumer's bread dollar to 79 cents of the consumer's butter dollar.

The cost of distributing products from a 1,000-pound beef animal was $49 in the five pre-war years, whereas now it is $100.80. This is an increase of more than 100 per cent, whereas the average price paid to farmers in the United States per 1,000 pounds for beef cattle was $53.10 pre-war, compared with $72.40 for 1927, an increase of about 36 per cent. The average retail value of products from a 1,000 pound beef animal was $102.10 pre-war, and for 1927 it was $173.20, an increase of approximately 70 per cent.

Similar calculations have been made by these economists for the distribution of other farm products. They show that the cost of distribution as related to 100 pounds of live hogs was $6.91 pre-war against $15.64 in 1927, an increase of 126 per cent. Farmers in the five-year pre-war period received an average of $7.25 per 100 pounds, and in 1927 they received $9.68, or an increase of about 34 per cent. Retail prices during this period increased approximately 90 per cent.

For the five years before the war, milk retailed at 9 cents per quart in New York City, and farmers received 3.4 cents for it, the distribution costs amounting to 4.6 cents. For December 1927, the retail price was 16 cents, of which farmers received 6.6 cents. Distribution cost was 9.4 cents or 92 per cent above the pre-war amount.

Farmers received 11.5 cents per pound for chickens for five years before the war. Live hens retailed at 20.5 cents, a difference of 9 cents. In 1927, farmers received 20.3 cents and retail prices averaged 36.9 cents, a difference of 16.6 cents. The spread between farm and retail prices increased from 9 to 16.6 cents, or 84 per cent.

A Larger Share

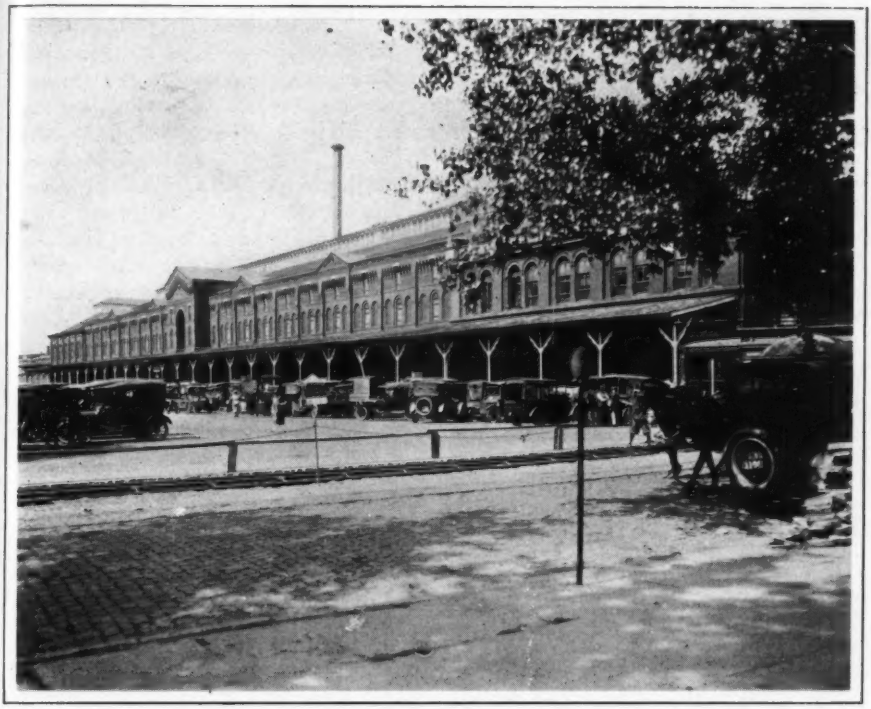
Similarly, the investigators found that the spread between the farm price of a bushel of wheat and the retail prices of its products has increased 84 per cent since pre-war. If sold as bread, the increased spread is 64 per cent. For lambs, retail prices are available for leg of lamb only. If the total retail value varies in the same way as leg of lamb, the cost of distribution in 1927, would be 129 per cent above pre-war.

How reduce these distribution costs so that farmers will receive a larger share of the retail price?

Some economists declare there is

ABOVE: Wholesale and Farmers' Market, Roanoke, Va.

RIGHT: A modern municipal market at Cleveland, Ohio.



Farmers' Market, Washington, D. C.

no prospect of reducing distribution costs, and that the only hope of improvement for farmers is to increase retail prices by curtailing production. A small crop, within certain limits, yields better prices than a relatively large crop. If farmers won't curtail production, say others, let's dump the surplus abroad, and thus increase prices to the consumer.

No, no! shouts the distributor, you mustn't increase food prices, the consumer won't stand for it. What we need is better distribution facilities. If we had central and joint unloading yards and wholesale markets, the excessive handling and delay in moving produce would be eliminated and distribution costs reduced.

Look at Cincinnati, he says. The movement of perishable freight there has been seriouslv handicapped for years. Great volumes of peaches, melons, citrus fruits, and vegetables from the South move through this gateway. A considerable portion of it is reconsigned to other points, but a large part of it must be inspected and re-iced. In the fall and winter a large volume of produce is received from the North and West, principally apples, cabbage, potatoes, cantaloupes, peaches, and grapes. There are times when, because of lack of facilities, it is impossible for all of this perishable produce to be placed promptly.

Approximately 100 cars of produce per day arrive at Cincinnati, of which nearly two-thirds are reconsigned. Firms with headquarters in Cincinnati are to a great extent not only shippers but actual growers, a large precentage of the perishable freight for consumption over the country being controlled from Cincinnati. Some terminal improvements are being made and additional tracks provided. A new union passenger station with larger freight facilities is to be built within the next five years at a cost of approximately

$75,000,000, which the Cincinnati trade hopes will afford some relief from the present congestion.

We need more facilities in all the consuming markets, the distributor continues, such as those at Jersey City which is itself a market outlet for some 300,000 consumers besides being a big factor in distribution for New York City. Jersey City has the largest receiving and break-up yard on the Atlantic coast devoted to perishable freight service. This yard provides facilities for 1,100 cars. The cars are passed over a gravity hump to their proper classification tracks, where they are segregated as to consignees and commodities. Consignees, by tariff authority, have the privilege of holding cars in the yard subject to orders, a special organization providing daily inspection of ice bunkers and ventilators.

These Jersey City facilities are esssentially a part of what is known as the Manhattan Produce Yard which has four display tracks where 450 cars of produce may be placed on display simultaneously. Adjacent to the display tracks is a delivery yard having a standing capacity of 600 cars. Wide driveways permit trucks to back up conveniently to the doors of cars, and still leave room through the center for the passage of two trucks abreast. Last year, more than 2,500 carloads of watermelons were sold at Manhattan Produce Yard; the juice grape receipts for the season approximated 10,000 cars.

Wages are the biggest item of expense in distribution. Economists see little prospect of materially lower city wages in the immediate future, so that it is only by the elimination of the wasteful processes of distribution that reduction can be made in distribution costs. Wages per man may not be reduced but the aggregate sum paid for labor certainly can be reduced by eliminating much of the hauling, re-hauling, handling, and re-handling of products in consuming markets. Terminal improvements which speed up the unloading of cars and prevent traffic congestion and delay are steps in the right direction.

Farmers, say the marketing experts, can contribute to a reduction in distribution costs by better preparation of products for market, and by marketing at the time and place best suited to consumer demand. The Department of Agriculture for nearly 15 years has been studying marketing processes, and has evolved from that experience a system of standard grades, shipping-point and receiving-market inspection, and market news collection and dissemination, the use of which is going far in improving marketing processes.

Standard grades have been established by the department for 34 different fruits and vegetables, for cotton, dairy and poultry products, grain, hay, livestock and meats, tobacco, and wool. These standards have been made the legal standards in a large number of states, and cooperative organizations have adopted them as a basis for pooling products. The shipping-point inspection service of the department has hastened the adoption and use of uniform standards by producers and shippers who are appreciating more and more the value of marketing products on the basis of well-recognized grades. Last year under this service, a total of 193,320 cars of fruits and vegetables were inspected at shipping points in 40 states.

Every farmer in the United States can now receive the daily Government produce market reports either in mimeograph form, in the newspaper, or by radio. These reports give conditions at all the leading consuming markets,—the volume of receipts, supplies rolling to market, market prices, and other trade factors. "Today's markets today" has been the department's slogan in building what is universally conceded to be the most efficient wire agricultural market news service in the world with its trained market reporters stationed at all the

(*Turn to Page 54*)

Smith - Hughes Projects That Grow with the Boy

By E. E. Gallup

Michigan State Supervisor of Agricultural Education

HAVING noticed that hit-or-miss project work often fails because it does not sufficiently challenge the mentality of the boy and particularly that such project work does not seem to relate him to his home community, we, in Michigan, have worked on a plan whereby our projects will be adapted to the mental development of the boy. They will go hand in hand with studies that are being pursued in school and, what is more fundamental, will make the boy an integral, responsible, bank-depositing, thinking part of the community upon his graduation from the high school. And if he chooses to go to college, the business that he has built up through his projects will help defray his college expenses.

More than this, the relating of 4-H Club work to Smith-Hughes project work is carried on so as to give a sequence of work, and thereby make more effective the energy of both organizations.

The 4-H club generally starts boys in the 7th and 8th grades either in crop improvement or animal clubs. A calf club generally comes first. A boy of that age is drawn to a calf, pig, or sheep—something that is alive, the care of which interests him more then than it would later.

Let us say that he starts with a dairy calf. When he comes into the agricultural department of the high school, he has a purebred heifer, often with a calf at side, which may challenge his ability as he proceeds through high school.

During the first year in high school, he enrolls in zoology, and this is motivated and made purposeful by the fact that he has these purebred animals upon which he can apply the principles of animal improvement and breeding that he is studying.

He also has agricultural botany. Already the problem of raising on the home farm the proper feeds for this purebred heifer and the calf are engaging his attention. And so in the spring of his first year, he gets started on some crop, generally alfalfa, because that has been brought to his attention as the queen of all the legume roughages.

An Engaging Study

Then as the herd develops, he has a chance to go further in his studies in inheritance and breeding, always with a practical laboratory in which to work right on his father's farm and in his own possession. He finds that feeding is a most engaging study, that his alfalfa is the basis of most profitable milk production, that the proper balance of grains is required, and on the other side of the fence, he finds that he can grow most of the concentrates that enter in the ration of the growing herd. This takes him into the realm of better grains and gets him interested in the aims and personnel of the Michigan Crop Improvement Association.

A little later, he finds that it is impossible to grow the best crops on the home farm without giving careful attention to liming the soil, the proper fertilizers to use, and when and how

(*Turn to Page* 53)

The kind of fertilizer that pays best can be determined by trial plots.

Potatoes in Wisconsin

By F. L. Musbach

Branch Experiment Station, Marshfield, Wisconsin

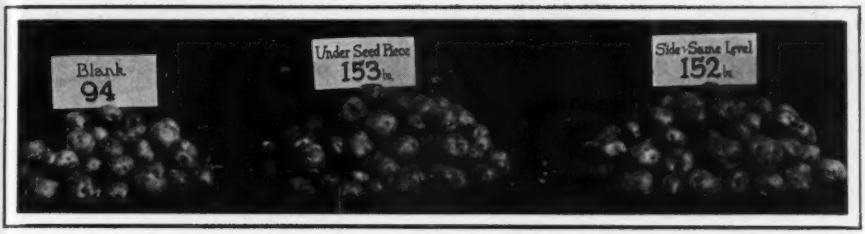
THE Irish potato ranks as one of the leading cash crops grown by the farmer. Six states, Wisconsin, Minnesota, Michigan, New York, Pennsylvania, and Maine, produce nearly one-half of the total crop, averaging in round numbers 300 million bushels.

The crop requires a large expenditure of horse and man labor which represents the largest single item in production costs. The labor costs are practically the same irrespective of yields. The total cost is usually greater, while the net returns are invariably better for the larger acre yield. A. M. Olson of Oneida county, Wisconsin, secured a 375-bushel yield in 1922 at a total cost of less than 20c per bushel. The market could have slumped to 25c per bushel and still provided a profit for Mr. Olson.

The humble tuber has several handicaps. It is not considered a strong feeder of plant food, not a good forager, so to speak. Then too, its root system is limited. The crop, therefore, is not able to make the contacts with plant food, as is the case of crops with a more extensive root system.

The yield is affected materially by temperature and moisture conditions. In general, cool growing weather is desirable, and evenly distributed rainfall is important. The crop is adapted to a wide range of soils, yet preference should be given to the loams and sandy loam types. The ease of working the ground, the good tilth that may be maintained, and the freedom from difficulty at digging time are factors that favor the loams.

"Taters" invariably respond to fertilizer treatment properly applied. It is quite impossible to write the best formula for each individual case. So much depends on the soil, the importance of legumes in the rotation, and whether manure is available. If the crop is grown on clover sod with manure, a low ammoniate fertilizer is usually most profitable.



Not only what to apply but also how to apply must be considered.

Whether high amounts pay is questionable. In the production of the characteristic food product, starch, potash is absolutely necessary. In just what way is not yet clearly understood. It is, therefore, necessary to provide ample potash in the fertilizer mixture. Phosphoric acid is necessary, but the need is less exacting. When phosphoric acid is used alone, the yields are frequently depressed due to forced maturity.

During 1927 fertilizer tests were run in the Antigo (Landglade county, Wisconsin), potato section, the results of which are indicated in the following table:

		Returns per acre above fertilizer cost
(1) No treatment	68 bu.	
(2) 750 lbs. 3-10-7	194 "	$59.17
(3) 750 lbs. 3-12-7	198 "	60.89
(4) 750 lbs. 5-8-7	200 "	61.34
(5) 750 lbs. 3-10-10	211 "	68.34
(6) 750 lbs. 3-12-12	234 "	81.10

These test plots occupied ground that had received little or no manure for some years. The field was in mixed clover hay, the second crop of which was plowed under for the tuber crop. All of the treatments were used at a profit after deducting fertilizer costs, but not the labor of application nor the extra work involved in harvesting the increased yield.

Under the conditions obtaining fertilizers relatively high in potash were justified. This is brought out in comparing plots 2 and 5 where an increase from 7 to 10 per cent in potash resulted in an increase of 17 bushels. Nos. 2 and 3 are also interesting. An increase of 2 per cent in phosphates raised the yield 4 bushels. But when the potash as well as the phosphate, is increased the highest yield and the most profitable acre returns above fertilizer cost are obtained. Plot 6, using 750 lbs 3-12-12 per acre, produced 234 bushels No. 1's and made a profit of more than $80.00 per acre after deducting cost of fertilizers.

Similar results obtained on other tests in the Antigo area indicate the need of a relatively high potash fertilizer. This type of fertilizer, it should be noted, applies in particular to the Antigo section. In other potato sections a somewhat different combination of plant foods may be found best, and it is only by making tests similar to these that the grower can obtain information concerning the

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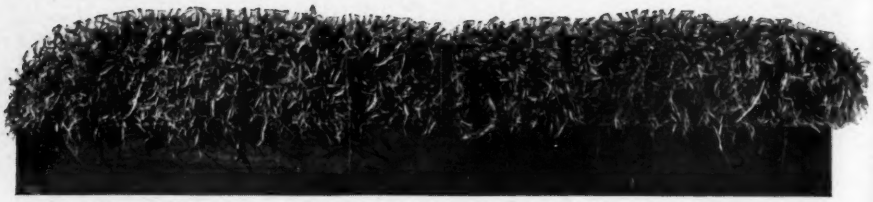

Feeding Sprouted Oats Corrects Non-breeding

By L. S. Richardson

INFERTILITY in cows and virgin heifers due to functional disorders has been successfuly overcome in the dairy herd of the Federal Department of Agriculture by the simple expedient of feeding sprouted oats for varying periods of from 10 to 122 days. The method was first tried in 1923 in an experimental way by R. R. Graves who is in charge of dairy cattle breeding investigations for the department.

In these preliminary trials, five of six virgin heifers that had failed to get with calf after being served repeatedly by different sires became settled with calf while receiving sprouted oats in their feed. Five of six non-breeding cows were also got with calf after a feeding period ranging from 19 to 46 days. Similar tests made at the Oregon Experiment Station at Mr. Graves' suggestion gave equally favorable results.

Veda's Interested Doris, the present Maryland State Junior 2-year-old Champion Jersey, owes her record to the discovery of the value of sprouted oats as an aid to correcting infertility. After failure to get with calf to six different services, she was placed on a diet of sprouted oats. Ten days later she was bred but failed to conceive. She was bred again 19 days later while still on the feed and became settled with calf from which freshening she produced her State record. She has since produced three calves. It was necessary to feed oats only for the second pregnancy.

The favorable results which followed these first trials led to the continued use of the oats in the breeding herd with equally good results. In fact, the oat-diet is now a regular practice in the Government herd and is recommended for all dairy herds where temporary or apparent sterility is prevalent.

In a more recent trial six cows, varying in age from 3½ to 8 years, received from 5 to 17 services without conceiving. After being placed on the oat diet, two of the cows conceived at the first service, two at the second, one at the third, and the other at the sixth. The latter cow required a feeding period of 132 days to overcome her inability to conceive.

Herd records showed that all heifers in the herd required an average of four services for initial conception. It was decided to determine whether sprouted oats would be effective in reducing the number of services required by virgin heifers for the first calf, and six were placed on the oat ration. Four of the six conceived at

the first service after receiving the oats for from 10 to 19 days.

Much of the breeding difficulty in dairy herds is due to functional disorders, says Mr. Graves, rather than to disease. In such cases, the feeding of sprouted oats has been found to be of great value. The dairy cattle industry is suffering a great loss of valuable breeding animals, as well as a loss of time between calving, because of the failure of many cows and heifers to breed regularly. Failure to conceive, or delayed conception, interferes seriously with herd management and consequently with the profitableness of the herd.

The possible value of sprouted oats in overcoming infertility in dairy cows was suggested to Mr. Graves by a study of the work done with small animals by Dr. Evans at the University of California. In tests with rats Dr. Evans discovered a fifth vitamin which he found had a bearing on the reproductive powers of these animals. He also found that this vitamin which he called E was contained in such feeds as the green leaves of lettuce and alfalfa. By feeding a ration heavy with vitamin E, he was able to overcome abortive tendencies in white rats and bring about normal birth.

He also demonstrated the effect of the vitamin on the number of spermatozoa in the semen of male rats. Litter brothers having an equal number of sperm cells in their semen were fed a vitamin-E diet and a vitamin-free diet respectively. Where the vitamin E was lacking in the ration, the number of spermatozoa in the semen was greatly reduced.

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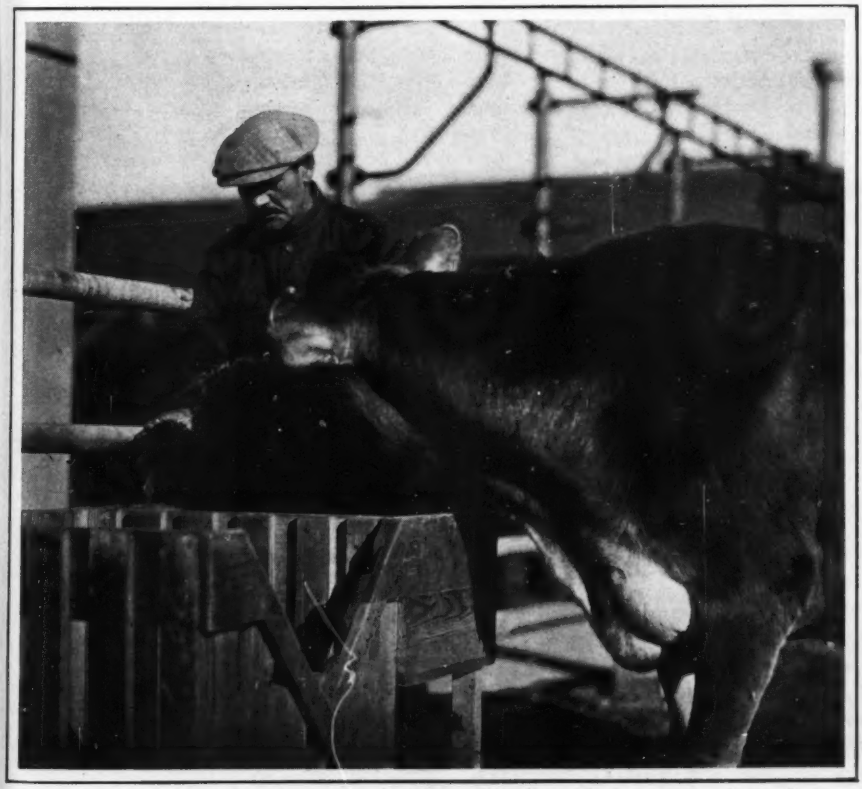


Sprouted oats are a delicacy relished by any cow.

Influence of Rotations and Soil Treatments on Crop Yields from Cecil Clay Loams

By C. B. Williams

North Carolina Experiment Station

THE use of well-adapted systems of crop rotation is one of the essential factors under the control of the farmer for better yields which Piedmont farmers of the South have not put into practice to the extent they might have. Without the use of such, well planned and carried out, it has been felt for some time that it is rarely possible for farmers generally to get either the greatest net returns in their production of crops or to most economically maintain their soils in a productive condition.

This being so, during the past few years considerable attention has been devoted by the Department of Agronomy of the North Carolina Experiment Station in devising and conducting field experiments. These experiments purpose to study under farm conditions the actual and relative value in crop yields of the use of different systems of crop rotation carried out on the dominant soil type areas occurring in the Piedmont, Coastal Plain, and Mountain sections of the state which are more or less typical of the dominant soils of these three soil provinces of the whole South.

In this article is presented briefly some of the field results secured in the regular crop rotation experiments conducted at the Piedmont Branch Station farm of the North Carolina Experiment Station. These experiments were made on the Cecil clay loam type of soil, which is an important type of a dominant series of soils used in the production of crops in the Piedmont section of the South. The results reported on at this time are from experiments which have been conducted continuously for nine years (1918-1926), using the crop rotations given below:

1. Continuous corn.
2. Continuous wheat.
3. 1st years—corn;
   2nd year—wheat.
4. 1st year—corn, cowpeas grown and plowed under for soil improvement;
   2nd year—wheat, cowpeas grown and plowed under for soil improvement.
5. 1st year—corn, cowpeas grown and plowed under for soil improvement;
   2nd year—wheat, red clover;
   3rd year—red clover.

In the last rotation the growth made by the red clover in the second year after one cutting has been made was plowed under for soil improvement.

The fertilizer and lime treatments given major crops used in the different rotations under observation have been as follows:

1. *For Corn and Wheat*—Used 300 pounds per acre in 1918 and 1919 and 400 pounds in 1920-26 inclusive, in the drill at planting, of a mixture containing 7 per cent available phosphoric acid, 3 per cent nitrogen, and 1½ per cent potash in their continuous cropping and whenever

these crops occurred in the other rotations.

2. *For Red Clover*—Used 400 pounds per acre of a mixture containing 8 per cent available phosphoric acid, 1 per cent nitrogen, and 4 per cent potash during 1918, 1921, and 1924, the years in which this crop was seeded in the 3-year rotation of the experiments.

3. *Ground Limestone*—Applied broadcast uniformly over the land of one-half of all the rotation plats at the rate of two tons per acre during the spring of 1918 and one ton each during the fall of 1922 and in spring of 1926.

Legumes (cowpeas and the second crop red clover) used in the various rotations for soil improvement were not fertilized directly except the red clover and after growth were plowed into the soil.

In order to determine the actual and relative value of the different crop rotations being studied, a comparison of the yield of major crops grown in the different rotations of the experiment is made as shown below with the average results given.

1. The 3-Year Rotation with Legumes vs. Continuous Single Cropping.

In a comparison of the 3-year rotation, consisting of corn with cowpeas sown broadcast in the crop just before the last cultivation; wheat sown in the early fall; red clover sown on the wheat during the early part of the spring following; red clover cut once for hay in the second year and the second crop of it allowed to grow and plowed into the soil for its improvement with continuous corn and continuous wheat, the average yields per acre of each and the differences in favor of the yields of corn and wheat in the 3-year rotation with legumes were as follows:

(1) With corn, an increase of 29.4 bushels or 156.4 per cent when treated with complete fertilizer and 37 bushels or 228.4 per cent when lime supplements the complete fertilizer application.

(2) With wheat, an increase of 7 bushels or 71.4 per cent from complete fertilizer treatment and 13.1 bushels or 126.0 per cent when the complete fertilizer was supplemented with a limestone application.

2. The 3-Year Rotation with Legumes vs. the 2-Year Rotation with Legumes.

The results summarizing the relative value of the 3-year and of the 2-year rotation, both having legumes grown with the major crops and used for soil improving purposes, are given below, showing the increased yields and percentages in favor of the former rotation:

(1) With corn, without either lime or fertilizer treatment, an increase of 0.1 bushels or 0.5 per cent; with limestone alone, 8.7 bushels or 35.9 per cent; with complete fertilizer alone, 14.5 bushels or 43.0 per cent; and with complete fertilizer supplemented by limestone applications, 20.0 bushels or 60.2 per cent.

(2) With wheat, the following increases in yields and percentages:

	bushels	per cent
(a) Unfertilized	2.3	85.2
(b) Limed	6.0	111.1
(c) Fertilized	4.6	37.7
(d) Fertilized and limed	8.3	54.6

3. The 3-Year Rotation with Legumes vs. the 2-Year Rotation without Legumes.

The average increases in yield per acre of corn and wheat, when each was grown in the former rotation, over the average yields made by them grown in the latter rotation were as follows:

(1) *With corn*—

	bushels	per cent
(a) Unfertilized	3.2	20.9
(b) Limed	12.2	58.9
(c) Fertilized	23.3	93.6
(d) Fertilized and limed	27.6	107.8

(2) *With wheat*—

	bushels	or per cent
(a) Unfertilized	3.0	150.0
(b) Limed	7.5	258.6
(c) Fertilized	7.3	76.8
(d) Fertlized and limed	11.9	102.6

4. The 2-Year Rotation with Legumes vs. the 2-Year Rotation without Legumes.

The average increase in yields per acre of corn and wheat when grown in the 2-year rotation with legumes is given below:

(1) *With corn*—

	bushels	or per cent
(a) Unfertilized	3.1	20.3
(b) Limed	3.5	17.0
(c) Fertilized	8.8	35.3
(d) Fertilized and limed	7.6	29.7

(2) *With wheat*—

	bushels	or per cent
(a) Unfertilized	0.7	35.0
(b) Limed	1.5	51.7
(c) Fertilized	2.7	28.4
(d) Fertilized and limed	3.6	31.0

5. The 2-Year Rotation with Legumes vs. Continuous Single Cropping.

The increase in average yields of corn and wheat in favor of the 2-year rotation with legumes were as follows:

(1) *With corn*—

	bushels	or per cent
(a) Fertilized	14.9	79.8
(b) Fertilized and limed	17.0	104.9

(2) *With wheat*—

	bushels	or per cent
(a) Fertilized	2.4	24.8
(b) Fertilized and limed	4.8	46.1

6. The 2-Year Rotation without Legumes vs. Continuous Single Cropping.

In growing corn and wheat in a 2-year rotation made up of these two crops only, as compared with growing them singly on the same land year after year, they yielded more per acre under the former plan by the following amounts and percentages:

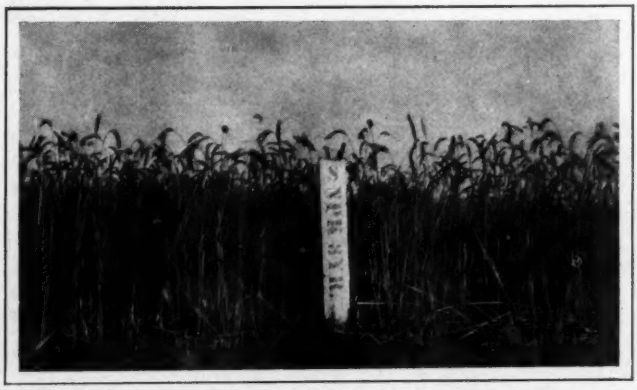
(1) *With corn*—

	bushels	or per cent
(a) Fertilized	6.1	32.4
(b) Fertilized and limed	9.4	58.0

(2) *With wheat*—

	bushels	or per cent
	less	less
(a) Fertilized	0.3	3.1
	more	more
(b) Fertilized and limed	1.2	11.5

Effect of Different Soil Treatments Upon the Yield of Crops Grown in Different Rotations



Wheat in 3-yr. rotation fertilezed with a complete fertilizer.

The value of the different crop rotations in inducing an increase in crop yields has been studied: (1) without fertilization of the crops; (2) by the use of limestone alone; (3) with the use of a complete fertilizer alone; and (4) with the use of

a complete fertilizer supplemented by an application of ground limestone.

(1) In the 3-year rotation with legumes, the average yield of the major crops was increased by the different treatments over no-fertilizer by the following amounts and percentages per acre:

Treatment	Corn		Wheat	
	Bus.	Pc.	Bus.	Pc.
Limestone	5.4	35.3	0.9	45.0
Fertilizer	9.5	62.7	7.5	375.0
Fertilizer & limestone	10.3	67.3	9.6	480.0

Treatment	Corn		Wheat		Red Clover	
	Bus.	Per cent	Bus.	Per cent	Lbs.	Per cent
Limestone	14.4	77.8	5.4	108.0	563	111.0
Fertilized	29.7	160.5	11.8	236.0	500	98.6
Fertilizer & limestone	34.7	187.6	18.5	370.0	1916	377.9

In the 3-year rotation on this type of soil, there was a decidedly marked increase from the use of limestone alone and with complete fertilizer with all three crops, the most marked percentage increases being with red clover and wheat.

(2) The crop increases over no-fertilizer in the 2-year rotation with legumes from the different treatments were as follows per acre:

Treatment	Corn		Wheat	
	Bus.	Pc.	Bus.	Pc.
Limestone	5.8	31.5	1.7	63.0
Fertilizer	15.3	83.2	9.5	351.9
Fertilizer & limestone	14.8	80.4	12.5	463.0

With this rotation, the greatest increases in yield of corn came from the use of a complete fertilizer. With wheat, the addition of limestone to the fertilizer gave an average annual increase of 3.0 bushels or 24.6 per cent per acre, but the corn in the rotation suffered a slight loss by the use of limestone added to the complete fertilizer application.

(3) With the 2-year rotation without legumes, the crops have yielded the following increases per acre by the different treatments over the no-fertilizer treatment:

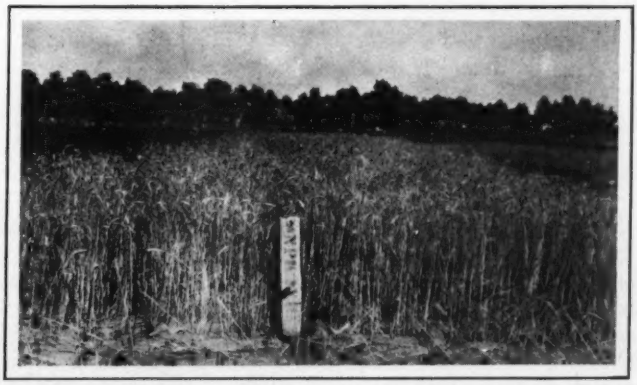
Treatment	Corn		Wheat	
	Bus.	Pc.	Bus.	Pc.
Limestone	5.4	35.3	0.9	45.0
Fertilizer	9.5	62.7	7.5	375.0
Fertilizer & limestone	10.3	67.3	9.6	480.0

With both corn and wheat, the most marked increases in yield have come from the use of a complete fertilizer. A small average increase for corn and a moderately large one for wheat resulted by the addition of limestone to the complete fertilizer.

(4) When corn and wheat were each grown continuously on the same land, the addition of limestone to a complete fertilizer application caused a slight decrease in the yield of corn and gave a small increase in the yield of wheat, but the increase with wheat was not sufficient to pay for the cost of the limestone applied.

General Conclusions

From the results secured and given above, the following general conclusions may be safely drawn from a study of different crop rotations con-



Wheat in continuous culture on the same land, fertilized with a complete fertilizer.

ducted on Cecil clay loam type of soil in the Piedmont section of North Carolina:

(1) A good system of crop rotation, as exemplified by the 3 and 2-year rotations given in this article in which suitable legumes are grown and plowed into the soil for its improvement, will usually materially increase the yield of crops in the rotations when all of the plant food needs of the major crops of them are properly met.

(2) Wheat, when fertilized and when limed and fertilized, grown in a 2-year rotation with corn and without leguminous cover crops has produced but small, if any, increase in yield over growing the crop continuously on the same land.

(3) On this type of soil, both corn and wheat have yielded better in a 3-year rotation with legumes than in a 2-year rotation with legumes, both when complete fertilizer alone and when complete fertilizer supplemented by limestone were properly applied to the crops.

(4) In the 3-year rotation with legumes; in the 2-year rotation with legumes; in the 2-year rotation without legumes; and in continuous cropping of single crops, corn has averaged by the different treatments the yields of wheat by the following factors:

	3-Yr. Rotation with legumes	2-Yr. Rotation with legumes	2-Yr. Rotation without legumes	Continuous single cropping
Unfertilized	3.7	6.8	7.7	. .
Limed	3.2	5.5	7.1	. .
Fertilized	2.9	2.8	2.6	1.9
Fertilized and limed	2.3	2.2	2.1	1.6

(5) Use of limestone alone, or as a supplement to a complete fertilizer, has been found to increase the yield of all crops used in the rotations decidedly more on this type of soil than it did when used in these two ways on the Norfolk sandy loam type of soil of the Coastal Plain region of North Carolina.

(6) In growing red clover in a 3-year rotation consisting of corn and cowpeas, wheat, and red clover, the use of both lime and complete fertilizer is essential for satisfactory yields. The complete fertilizer and limestone used separately resulted in about the same increases in yield, and when both of these were used together on the land their use more than doubled the increase in yield secured by both used separately.

(7) In the continuous cropping of corn and of wheat without rotation, the use of limestone as a supplement to a complete fertilizer has had only slight effect in increasing the yields of these crops above what were secured from them by the use of complete fertilizer alone.

(8) In all the rotations studied with all the major crops, the greatest response in increased yields has been found to be from the use of a complete fertilizer, except with red clover.

(9) Both corn and wheat grown in the 3-year rotation with legumes made far greater responses in increased yields from the use of complete fertilizer supplemented by additions of limestone at three-year intervals than they did when grown in either of the two 2-year rotations or when they were grown continuously on the same land.

(10) On this type of soil without rotation, including legumes grown and used for soil improving purposes, the yields of corn and of wheat were not sufficiently large on an average to be profitable, either from the use of limestone alone or from a complete fertilizer supplemented by limestone applications.

Proper terracing would prevent soil erosion like this.

TERRACING

By D. Scoates

Agricultural Engineer, Texas A. & M. College

THE results of soil washing are, loss of the more fertile part of the soil, formation of gullies, clogging of streams, unprofitable farming, and depreciation of farm values. The washing takes the upper or top soil first. This is the best part of the soil. Its loss means a loss of a very vital part of the farm. The soil thus removed in many cases is deposited at lower points in creeks or rivers, tending to fill them and obstructing natural drainage. If it should go farther and get in a large stream, it does damage to navigation. The formation of gullies is in itself a bad feature, as gullies make the use of modern labor-saving machinery difficult. The loss of soil fertility naturally brings on unprofitable farming, which in turn causes a depreciation in land value.

The control of soil washing is obtained in a number of different ways. Some farms call for one method, some for another, and still others for a combination of several. There are a number of things which assist materially in the control wherever it is found.

The use of winter cover crops is important on cultivated land. During the fall and winter months heavy rains usually come at a time when the soil is in poorest condition to receive them. If a cover crop is on the land, it tends to hold up the soil and help absorb the moisture.

Addition of organic matter or humus to the soil is another factor which will help to control washing. Soils deficient in this substance are usually the ones that wash the easiest. Soils having an abundance of humus absorb an abundance of water and are not easily washed.

Deep plowing assists materially in controlling soil washing, for by plowing deep the soil moisture reservoir is increased, the moisture holding power of the soil is increased, its washing qualities are decreased.

Contour farming, as it is often called, is a very vital factor in soil washing control. By "contour farming" is meant the plowing and cultivation of the soil with the contour of the land, rather than up and down the slope. Too often this latter method is followed, with the result that the furrows and rows offer easy avenues for the surplus water to collect and run in so that it attains considerable velocity in its flow down the hill and erodes the soil badly.

Many slopes are too steep to cultivate successfully. It is possible to handle them so as to prevent soil washing and still produce a cultivated crop, but not with profit. In such cases, it is best to sod these slopes down for pasture use or reforest them. All farms must have pastures, and the steep slopes can be used for this purpose to good advantage. The reforestation of our land is an important problem. Our lumber supply is being depleted, with the result that lumber prices are advancing. Therefore, the progressive farmer will set aside a portion of his farm for a woodlot.

Soil Savers

The hilliest part of the farm can be used for this purpose. Forests with their natural grasses are excellent soil savers. As to the degree of slope land may possess and still be profitably cultivated, no definite rule can be laid down to cover all cases. One authority recommends that all land with a slope of 12 feet or more in 100 feet be used for pasture or woodlot purposes, while another advocates the same use for impervious soils possessing a slope of 15 feet in 100, and for all other soils the slope of which is as much as 20 feet in 100 feet.

The use of tile drainage to prevent soil washing is feasible and will almost wholly control the soils of moderately flat slopes where the land is fertile and well handled. Tile drainage deepens the seedbed, thus increasing the moisture absorbing qualities of the soil. The cost of tiling often prohibits its use in badly washed soils because the expense will not be warranted by the yields. In some special cases a seepy hillside, added to the rainfall, makes tiling the only solution. In this case, tile draining the seeps aerates the soil and produces the desired results.

The use of hillside ditches, as a control measure, is necessary in some cases, but as a general rule, it is not to be advocated. The hillside ditch is an open ditch, for example, an excavation with two banks. It is not to be confused with a terrace. The chief objections to an open ditch are: It offers an obstruction in the field to the use of modern labor-saving machinery; its size, shape, and fall are hard to control, and therefore the soil washing is not controlled to the best advantage. There are some conditions under which its use is necessary, for example, to intercept surface water from adjoining higher land and to provide an outlet for terraces.

The use of terraces is by far the best and most satisfactory method of controlling soil washing. These other methods given are used to help and in some instances they will, of their own accord, control the situation. However, in most cases where soil washing is taking place to any considerable degree, it is necessary to resort to the terrace.

The Bench type of terrace is used very little in this country for agricultural purposes, its use being principally confined to the landscaping of small grounds.

The Narrow terrace, often called the "Razor Back terrace" is a small terrace 3 to 5 feet wide at the base and 1 to 2 feet high. It is built with and without fall along the terrace. The former is known as the graded and the latter as the level Narrow terrace. These terraces must be spaced

A bad wash starting as a result of a break in terrace.

close together and almost always are allowed to grow up in grass or weeds. The holding capacity of this terrace is small. It can be successful only on gentle slopes, open soils, or where the rainfall is small. It has the added disadvantage of offering harboring places for insects and taking soil moisture from surrounding soil, which reduces crop yields. They are, in short, waste lands in the fields. It is also difficult to use modern farm machinery in fields so terraced. Therefore, the Narrow terrace either in its level or graded form is to be condemned.

The Broad Terrace

The Broad terrace, often called the Magnum terrace, whether level or graded has the same general make-up and it will be discussed without reference to its grade here. These terraces have a bottom width of from 12 to 25 feet, depending on the slope of the land. For the steeper slopes the smaller widths are used, while for the gentler slopes the wider terraces are used. This terrace is used most because: It is not an obstacle to the use of modern farm machinery; it can be cultivated and is not waste land in the fields; it does not harbor insects. The height of the terrace bank varies from 1 to 1½ feet.

There are three different methods of construction for obtaining the necessary fall along the terrace. These are the level, uniform grade, and variable grade.

The level Broad terrace is laid off absolutely level, or in other words on contour lines, and the water in order to run off must back up sufficiently in the terrace to get the desired fall in the water itself. Long lengths of terrace must be avoided to prevent erosion. These terraces must be spaced close together in order to prevent a relatively small catchment area. They should be built only in localities which do not have an abundance of rainfall. The purpose of this type of terrace is to have as much as possible of the water absorbed by the soil. Their success depends on whether they are properly laid off or not. All points on the terrace must be at the same elevation. In other words, the terrace must be level. The graded terrace is, by far, the most popular and can be depended on to produce results where the others fail.

The general rule for determining the distance between terraces is: To get along with as few terraces as possible, as they are expensive to build and to maintain. It is also true that they are expensive to get along with-

out. J. T. Copeland, Mississippi Extension Agricultural Engineer, suggests that the proper way to space terraces is to go to the highest point on the land and then come down the slope to the start of the first wash. Take this difference in elevation as the spacing for the terraces on that hillside.

The Variable Graded Broad terrace is of more recent origin than the other types and is not so well understood. It is, however, becoming very popular in some sections due to the fact that it seems better adapted to a wider range of soil conditions and topography than the others. The upper end of the terrace is often laid flat, or having very little fall, perhaps ½ to 1 inch per 100 feet, the grade is changed every 200 or 300 feet and at all sharp bends or depressions, the final grade of the terrace being not greater than would be used on the same type soil for a uniformly graded terrace.

The Best Land First

The first thing to consider in the location of terraces is the surface drainage of the entire farm and the several farms adjoining the one to be terraced, in so far as they affect the latter. It is important that the following points be carefully considered: how much water is to be controlled; where the water is coming from; where the outlets are or how they are to be provided; the type of soil to be terraced; general condition of the washed or washing soils; crops to be raised on the land; and what amount of land is to be terraced right away.

It is desirable to terrace the best land first, that is, the land having the greatest fertility and which is not in the worst state of erosion. The reason for this is that the best land will give the greatest returns for labor expended.

In the locating of a terrace there is almost always some limiting factor which determines the location of the terrace. It may be some point where the outlet must occur, or it may be a gully, a fence, building, or tree. If there is not a limiting factor which requires some certain terrace to be laid off first, the top one is taken as it is the easiest. The distance between terraces being determined, this amount can be taken below the top of the hill, and, if there are no other limiting factors, the terrace run out. This is not always necessary, as it is often found desirable to run one of the other terraces first. The top terrace should, however, be constructed first in order to keep the water off the lower terraces and thus prevent them from washing out.

There are two methods of laying out terraces: with home-made level and with a regular telescopic surveying level. Both methods give good results. The advantage of the home-made level is that it can be easily constructed on the farm with little expense. The level having a telescope is more costly, but terraces can be laid out more quickly by its use.

The marking of the points on the terrace, as it is laid off, is a very important thing. Too often this is done in a slip-shod manner and results in the points getting lost or considerable time wasted in finding them. It is best to use good wooden stakes or some pieces of heavy wire to each of which is tied a piece of red or white cloth.

To locate a terrace above or below the one just laid out, a reading can be made on any part of the finished terrace and the target moved up or down the number of feet equal to the difference in elevation between terraces.

When a terrace is laid off with an instrument, it is theoretically correct. The terrace has the exact fall intended. Due to this, it may, and probably will, have some very sharp turns in it. To build the terrace to exactly follow these turns would probably be impractical and when so built the terrace might not hold the water because a stream of water does not rapidly

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Healthy Crops

By Roger C. Smith

Kansas State Agricultural College

IT is a fact that the weak crops are more severely damaged by injurious insects than are healthy ones. It appears anomalous, but it is nature's way of taking away from him who hath not.

There are good reasons why the poor crops and weak stands suffer most. It is a question of vitality and power of recuperation. As healthy animals are able to recover from injuries more rapidly and completely than weak sickly ones, in a similar way are healthy well-nourished plants better able to recover from setbacks than are weak ones. Any one can make this observation on field crops or even on some house plants.

I once saw a striking object lesson of this fact on two fine large farms in the fertile Shenandoah valley of Virginia. A large field of corn on a scientifically managed estate appeared exceptionally fine in early September 1919. A careful examination showed that approximately only 15 per cent of the ears were infested with the corn ear-worm. Across the road on the same kind of soil was another big field of corn. The farm had long been operated by tenants and the soil was run down. While the corn had been put out at the proper time and had been satisfactorily cultivated, the growth was noticeably less vigorous and the crop was a poor one for that region. It was found that fully 85 per cent of the ears were damaged by the corn ear-worm, more than five times as many as in the other field.

But that was not all. The injury to the ears in the first field was exceedingly slight. Many ears showed silk or husk injury only, some others had only one or two kernels damaged. On the other hand, the field with 85 per cent of the ears infested had much more severe injury to the ears. The husks were more severely damaged and the accumulated excrement there was fostering molds which would further reduce the value of the ears.

While certain other factors were involved, it was our judgment that the most important one was the difference in soil fertility manifested in a slower growing, weaker stand.

Weak Crops Susceptible

Those responsible for carrying on the research work with the European corn borer recognize the difference between weak and vigorous plants. They are endeavoring to obtain by crossing or selection a variety of corn that will tolerate more than five borers per stalk and still produce a good ear. Present varieties will generally tolerate as many as five borers and may not show any injury, but a weak plant is generally less tolerant than a strong one. Then they are working on soil handling practices, fertilizers, and means of hastening or retarding growth to see how the plants react to a light or a severe infestation.

Our eight years of intensive study of alfalfa insects at this station bears out this point also. While it is true that one often finds the most insects on the heaviest stands or growths of alfalfa, yet it is the thin, weak stands which first show the effects of insect damage. Alfalfa when free from disease and on the proper soil normally

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Cooperative Marketing Increases the Farmers' Buying Power

By U. V. Wilcox

Washington, D. C.

SOME of the cooperative associations are actually increasing the farmer's buying power through development of the policy of selling the farm products throughout the year, instead of seasonably. This means that the farmer instead of receiving his money only during a limited period, has his income distributed over a period of 10 to 12 months.

The Bureau of Agricultural Economics of the United States Department of Agriculture has been giving intensive study to the new trend. Chris. L. Christensen, chief of the cooperative marketing work of the Bureau has said that there is no question that the orderly marketing of farm products is having a marked influence on distributing and extending the farmer's buying power.

Evidence of Change

As an indication of the change, Mr. Christensen refers to a number of reports recently furnished the Department by the cotton cooperatives. Orderly marketing is one of the principles on which their effort is based. As a result there is a decided stabilization of prices because the association disposes of the products in such quantities as are needed in consumptive channels. The price obtained for the growers closely approximates the average price for the year.

Cotton farmers, as do farmers of other products acting individually, market the bulk of their crop in a short period. Based on a ten-year average, from 1912 to 1922, the farmers sold a total of 67.6 per cent of the crop from September to December, inclusive.

But in contrast to this, a study of the distribution of sales by a number of cooperatives shows that they market a large proportion of their product in the fall months, but have greatly reduced the individual farmer's tendency to "dump" his crop. During the same period of months a Texas cooperative, for example, sold 23.1 per cent of its total 1922-23 sales and 44.7 per cent in the 1923-24 season.

During the same four months, the Alabama association sold 19.2 per cent in the 1922-23 season, the Arkansas association 27.9 per cent, and the Oklahoma association 52.3 per cent.

These figures are expressive of the change that is now apparent. There are decided indications that the cooperatives have been successful in carrying out their orderly marketing program so far as their own membership is concerned by reducing to some extent the volume of early selling, by stabilizing the market for their members, and by obtaining for their members the approximate average price of the year, and distributing the income more generally throughout the year.

Extends Selling Period

"Many associations which handle other products," Mr. Christensen explained, "will show an even better record. The purchasing power of the farmer has been kept down in many instances more because of the handling of his income than because of the size

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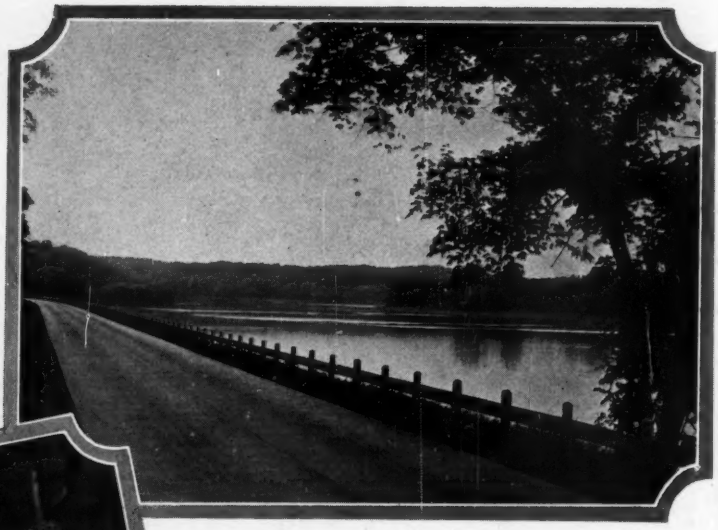
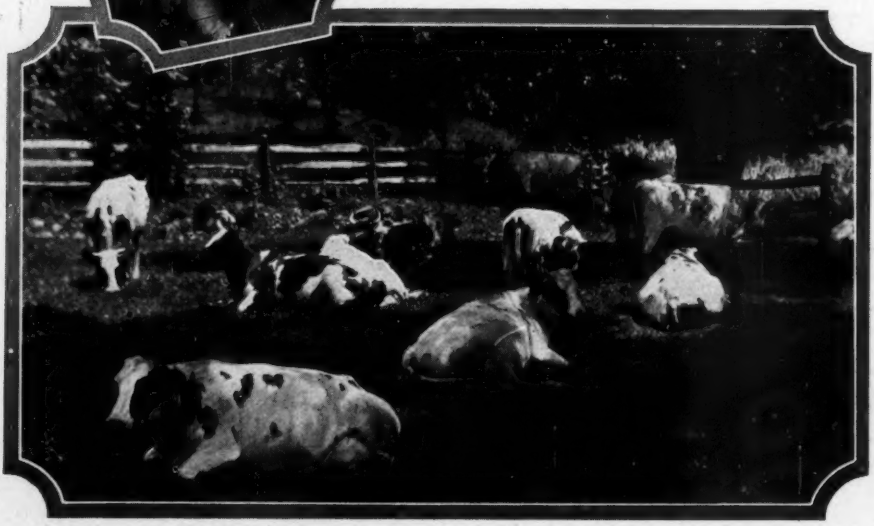
Pictorial



An inviting drive along the Rock River near Oregon, Illinois.

An armful of chicken.



A corner in contentment. This is a familiar sight on many American farms in mid-afternoon of a June day.

Starting 'em right. It is not so easy as this young farmer would have you believe.

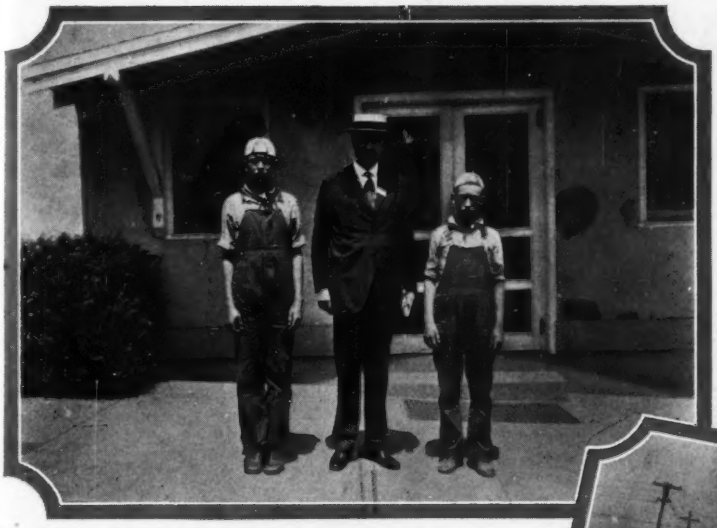
Who goes there?

Ugh, it may be a worm. The fair gardener looks as though she wouldn't stay very long if it proved to be a worm.

The Remington, Indiana, Bug Club. Each of these boys and girls caught, mounted, and identified 100 native insects. Many of these same boys and girls were also members of the Remington Pest Crusaders who exterminated more than 16,000 pests (English sparrows, rats, and mice) in two months. One boy destroyed 1,500 single handed. Each killed 200 or more pests.

County Agent A. R. Morrow of Statesville, N. C., and W. B. Harris, master farmer of Mooresville, N. C., examining alfalfa roots on the latter's farm.

This Alabama farmer built racks on the side of his milk delivery truck for the empty cans so that he could haul home a load of ice, feed, or other products for the farm.



Two of Georgia's leader boys photographed with Senator Hoke Smith. At the left is Cecil Shadburn of Bibb county; on the right is Roy Story of Crisp county. Senator Smith was co-author of the Smith-Lever bill that made 4-H Club work possible for farm boys and girls.

An entomologist of the U. S. D. A. constructed this artificial Jimson weed with blossoms so realistic in appearance and attractive in scent that they attracted the moths of the tobacco worm even more than did the natural plant. The paper flowers were scented with amyl salicylate.

Enjoying the noon rest period on the front porch of J. Wade Drake's farm home, Anderson, N. C. Too many farmers go direct from the table to the field.

Dr. E. W. Brandes, U. S. D. A. sugar plant expert, and Dr. Jakob Jesweit of Holland, who are now on a plant exploration trip in New Guinea. With the use of an airplane they are searching this wild island for sugar cane plants resistant to disease.

Dr. R. A. Ramsey, in charge of the cattle tick eradication work for the U. S. D. A., and his latest map showing how the tick area of the South has been reduced since 1906. The dark areas show the last strongholds of this destructive pest, but for various reasons they are probably the hardest areas to clean up.

The Editors Talk

A Unique Opportunity

The consumption of potash in many countries of the world has increased rapidly during recent years. This is in striking contrast to potash consumption in the United States, which is now only slightly above the consumption in 1913.

As shown by government figures in a news release dated May 10, 1928, entitled, "Production of Potash in 1927," the consumption of potash in the United States in that year was 274,473 short tons of actual potash. Fourteen years previously, in 1913, it was 256,561 tons of actual potash, an average increase of a little over 1,000 tons per year.

On the other hand, consumption in Holland has increased more than 100 per cent, or from 43,000 tons in 1913 to 93,000 tons in 1927. During the same period consumption in Great Britain increased about 75 per cent, from 29,000 to 52,000 tons. Again, Germany in the fertilizer year 1913-14 consumed about 490,000 tons of pure potash and in the year 1927-28 about 800,000 tons. France used in 1913 about 30,000 tons of pure potash and is using now nearly 170,000 tons. During the same period Belgium increased its consumption nearly 150 per cent, from approximately 15,000 to 37,000 tons.

The farmers of all these countries are naturally thrifty people and will not spend a penny for fertilizer unless they know that a benefit is to be derived from its use. Hence, it is certain that the use of this increased potash consumption was profitable to the agriculture of the respective countries.

The above two pictures present a striking contrast. But in addition, it must also be remembered that for five years, 1915-19, only about 200,000 tons of actual potash were used in the United States. In comparison with the amount used in 1913, this created an actual shortage of about 1,000,000 tons of pure potash applied to American soils in this five-year period. This shortage has never been made up. If in addition to this shortage the annual increase of 10 per cent in potash consumption each year, which occurred for a decade before the war, is taken into consideration, then the present shortage runs into some millions of tons.

This situation both reflects and causes conditions which are vital in our national agricultural welfare.

It reflects the low purchasing power of the farmer's dollar since 1921. It also reflects to a certain extent a lack of the realization of the true place of potash in our national agriculture. Possibly a part of this potash shortage is to be attributed to a misconception regarding the price of potash and other factors relating to its distribution. The facts are that the index number for the price of potash salts used in fertilizers in May, 1928, was only 94, that is, in comparison with prices from 1910-14. Present prices are, therefore, lower than in 1914. These low prices have been maintained in spite of much higher costs for wages, rail and ocean transportation, and other factors entering into the production of potash.

The condition this shortage causes is disease and a poorer quality of many

of our major crops. It is a striking coincidence that in recent years increased evidences of disease, due in part to potash deficiency, have been reported, especially on corn, legumes, cotton, and some other crops. In scientific circles there is a much greater interest in such diseases than was taken years ago, which has led to more research work. This is to be highly commended. There is a real need for such efforts being carried out.

In view of these considerations a responsibility of some importance rests on our agricultural leaders in seeing to it that the true status of potash in American agriculture is properly understood. Certainly, the steady supply of European potash with the supply of potash produced in America is a true and essential service to our national agriculture.

Potash is essential in crop production. Potash is supplied to the farmer at low prices. Farmers can make a profit on potash at these prices, shown by many results of fertilizer experiments conducted by the State Experiment Stations. Potash is only recommended for use where it is needed and where it will pay a profit.

For these reasons, the potash industry is rendering a real service to the farmer and American agriculture. But because of the shortage that exists in many of our American soils, there exists in America a unique opportunity that probably cannot be duplicated in any other country, an opportunity in the field of research to determine more accurately the role of potassium in crop production, and an opportunity in the field of distribution to see to it that the farmer obtains at low prices the fertilizer he requires for the most economical production of his crops.

The Spade and the Auger

The spade is replacing the auger in soil surveys. Soil survey men are not now content with merely boring a hole in the ground. They carry a spade along to dig a profile to see the face of the soil. Technically, of course, a profile is everything presented to the eye in a vertical cut through the soil, exposing its various horizons. This face shows whether the soil is young or old, as it gets older, what changes are taking place.

Further than this, great progress has been made in the relationship that has been established between the soils of one region, say in the southern Piedmont, and between the soils of other regions of the United States. This was a great need. This relationship in a measure has been supplied by the work of the Russian School of Soil Scientists.

Broadly speaking, the older system of soil classification has a distinctly geological basis. Soils were regarded simply as end products of rock weathering—in other words, dirt, loam, clay, etc. There was little or no relationship.

Contrasted with this older idea, the newer concept is that soils are "naturally dynamic bodies," not merely dead inert end products. Soils are now regarded as living bodies, the product of powerful soil-forming forces, which forces are constantly tending to produce mature bodies.

When these forces, particularly the climatic factors, moisture and tem-

perature, act unhindered, mature soil bodies are developed. Thus this new concept of soil classification supplies not only a basis for showing the relationship between the great soil bodies of the world, but it also provides a comprehensive and natural scheme of soil classification and also fundamental principles on which to found a separate soil science. These concepts have attracted world-wide attention as they well might. America, for instance, possesses about 350,000,000 acres of arable land. To know this heritage intimately, what are its characteristics, its relationships, its possibilities, and what are the best methods of handling it are questions of vital importance to our welfare.

Therefore, whether the ideas of the Russian School are fully accepted or not, they certainly have stimulated an interest in soils which was badly needed. They have given a more fundamental content to soil science itself and made available a body of thought which will attract to soil science some of the best minds of the next generation.

These are a lasting contribution to a scientific and rational agriculture, whether or not we agree at the moment on the details of the present method of making a soil survey.

Out West

If talk will settle any problem, then may we not hopefully expect a full settlement of all farm problems this year. The hard-working friends of the farmer are raising their voices on high, and from all accounts these voices will ere long be raised in a mighty chorus, not wasted in any wilderness, but within easy hearing at the meetings of the great chieftains of the political clans.

Many roads will lead out West during the month. May the reception be cordial and the meetings to the chieftains' liking.

The chiefs of an older day, in 1770 to be exact, objected even to the good roads, much less the folks who came by them. Roads make travel easier. The objections were very practical and to the point, for "by admitting strangers among them, their clans were taught that the Lairds were not the first men." The chiefs' influence waned. Then too, according to Sinclair, the chieftains' maxim was "'the more inaccessible, the more secure."

Dignity and power yet rest in a large measure on inaccessibility in politics and business, but political and business chiefs of today cannot longer keep the farmers' friends waiting. While possibly the good friends have not been exactly invited, they are, if all accounts be true, going in numbers calculated to make on the chiefs an impression that will settle all farm problems for generations to come. At least the friends intend to talk.

But would a settlement of all farm problems be a real blessing? What would the hard-working friends of the farmer do in the future? Knowing only the minutia and "imperfecti" of the farmer's work and his problems, a settlement would put them out of a job. No, probably there is little danger that the farm problem will be settled. The talk by all appearances will continue. The dimensions of the problem will be limited only by the various capacities of the friends to keep it alive.

Much of the talk this month and for many months to come undoubtedly will be about national agricultural programs and policies. Many important

bodies and individuals have published their ideas on this question. Among them are the Businessmen's Commission of Agriculture, the Association of Land Grant Colleges, the National Industrial Conference Board and the United States Congress. Some states and regions have issued such programs, but largely only in part.

It is significant, however, that about thirteen states had not at the end of 1927 published any long-time state program or policy for agriculture. Many other states have published only partial and incomplete programs. Included in this list are some of the best agricultural states of the Midwest, the Northeast, and the South. They seem to be doing a good day's work tackling problems as they come and getting along very well. In fact, they seem somewhat contented.

In view of all the talk, it would seem that the voices of the friends of the farmer possibly do not represent the whole of the farmers of this country, or perhaps not even a large part. The real farmer is to be respected. He is a very essential character in our national life, contributing to both its moral and material values. His problems should be given every consideration. It is quite evident, however, that the country as a whole is not at all unanimous in deciding what the best policy should be to help him.

The reasons for this divergence of opinion are many and varied. Prominent among them are the need for much deeper and more comprehensive research work on agricultural problems, particularly from the economic viewpoint. Of equal importance is the need for clearer, more honest, and straightforward thinking regarding the financial and commercial status of the farmer. We are too much afraid that efficient organization of farming units will commercialize the farm and demoralize rural values.

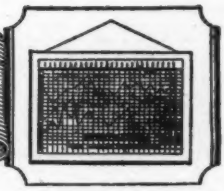
Until much more clear thinking has been done on these two fundamentals, a unanimous policy for agriculture as a whole is quite impossible. It is quite unlikely, therefore, that the political chieftains will worry very much who the folks are that travel the long road to their meeting place. They will know exactly what to do under present conditions to preserve their power, and we hope their dignity, in spite of the good roads that bring strangers and friends of the farmer within their gates.

Learn Most by Doing

The United States Department of Agriculture in its extension service always endeavors to get people interested in doing something rather than in listening to a speaker or watching him. This principle is sound. Added proof of its soundness is found in a letter from a State demonstrator who has been conducting schools in farm accounting. In these schools each person is expected to work out the business record of a typical farm in one of the account books provided in the course.

"From our experience in holding these schools," says the demonstrator, "we have arrived at the following statistics: People composing a general audience will remember one-tenth of what they hear, three-tenths of what they see, five-tenths of what they see and hear, seven-tenths of what they say, and nine-tenths of what they do."

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

PAY FARMERS FOR PROTEIN IN WHEAT

Progress is being made in solving the problem of paying farmers according to the protein content of their wheat. In North Dakota some farmers' elevators are paying according to the protein test. The elevator managers bin together wheats of similar protein content and take individual samples of the wheat brought in by each farmer. It is, of course, up to the elevator manager at the time he receives the delivery from the farmer to decide whether this particular wheat is likely to be high, low, or medium as to protein content, and it is said that he can make his decision on the basis of physical appearance with a degree of accuracy high enough to make the results satisfactory.

ROADSIDE MARKET NEARLY EIGHTY YEARS OLD

A roadside market in New Hampshire has been selling farm products to travelers and residents of the vicinity since 1850. This old stand has kept up with the times, and when the automobile became a factor, it was equipped for handling gas and oil. However, the big increase in business has come through the opportunity to sell greater quantities of fruits and vegetables and other farm products to the people in nearby towns. According to a study made in New Hampshire, the distance from cities or villages is less important in the success of a roadside stand than the number of automobiles passing. The number of cars is the big factor just as the number of persons passing a street corner in a city determines its value as a location for retail stores.

FARMERS NEED LIBRARY SERVICE

Forty-five million persons in the United States lack public library service and more than 42,000,000 of these are on farms or in villages of less than 2,500 population. This means that 82 per cent of our country people are without public library service. Wayne C. Nason of the Department of Agriculture in discussing this library question says that farm people are great readers, especially in the winter, but that they confine much of their reading to farm journals and newspapers rather than books because books are expensive and, because of the lack of libraries, not easy to get without spending much money. In recent years there has been a great increase in rural libraries and in library service to country districts. As a result of an investigation Mr. Nason concludes that the county library organizations with the service supported by a moderate tax is the best method of supplying rural districts with a satisfactory book service. Two-thirds of the states now have laws permitting taxation for the support of county libraries. Forty-six out of 58 California counties now have such libraries and two-fifths of the counties in New Jersey have established such service since 1920. There are now 245 counties in the United States that have established this county library service.

WOULD DO AWAY WITH SMUT LOSSES IN CORN

Plant breeders have made great progress in developing varieties of various crops resistant to diseases of many kinds but the problems remaining in this field promise to keep scientists busy for a long time. Corn smut has been a loss producer beyond the memory of any living corn growers and is still cutting into the crop to the extent of 1½ to 2 per cent every year. The experiment station staff of the University of Minnesota has set out to develop smut-resistant varieties and results so far have been promising.

CHICKS KNOW MILK SUBSTITUTE

Skim-milk and nothing but skim-milk in liquid form gives the best results with the Wisconsin chick ration, according to J. G. Halpin, head of the poultry department of the Wisconsin College of Agriculture, who has found that no substitutes produce the same results as liquid skim-milk. The Wisconsin ration is made up of 80 parts ground yellow corn, 20 parts wheat middlings, 5 parts raw bone-meal, 5 parts pearled grit or fine oyster shell, and 1 part common salt, with plenty of skim-milk fed in addition. Neither dried skim-milk nor meat scrap equalled skim-milk, and when they were fed, the death rate increased somewhat above the rate when liquid skim-milk was fed with this ration.

TORNADO-RESISTANT BUILDINGS

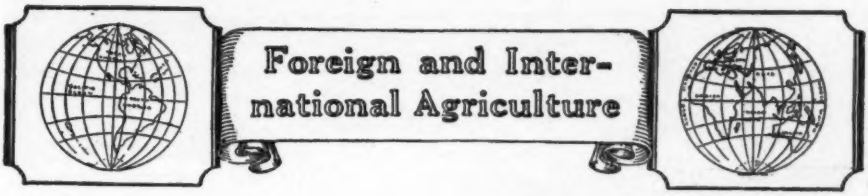
Buildings can be made to resist tornadoes, according to the Forest Products Laboratory of the Department of Agriculture. Much damage caused by tornadoes is the result of the explosive effect resulting from atmospheric pressure inside the building when the tornado has produced a partial vacuum outside. The plan of protection against this explosive effect consists in providing automatic vents which should make up 10 to 15 per cent of the outside walls and roof area. The investigators suggest that these vents could be windows or panels so designed that they would open outward from internal pressure. These windows and panels they say might be fastened with hardware working on the same principle as the "panic bolts" used on exit doors in theatres. This sort of equipment, it is suggested, could be put in exisiting buildings as well as in new ones.

SUCCESSFUL FARMERS ARE READERS

The Oklahoma A. & M. College has studied 523 farm homes in five counties from the standpoint of periodical reading matter in them. These farm homes averaged 3.54 periodicals, but a little more than 10 per cent were without any periodicals at all. Families owning their farms averaged 4.3 perodicals, renters averaged 2.8, and laborers 1.3. Financial success seemed generally to go along with plenty of periodical reading matter.

TEST PLANTS IN SUMMER FOR WINTER HARDINESS

The University Farm, St. Paul, Minnesota, now has a group of cold temperature chambers which enable plant breeders and pathologists to test the effects of different temperatures on all sorts of plants. It will not be necessary now to wait for proper weather to determine if a certain plant is winter hardy, as the test can be made at any time in one of these four chambers which are built of concrete blocks with dividing walls of sheet cork a foot thick. In one of these a steady temperature of 32 degrees above zero can be maintained, in another 14 degrees above, in one 4 below, and in one 58 below. Fruit trees that fail to stand the test for northern winters can be discarded without costly outdoor trial. The same test may be used on wheat, rye, alfalfa, etc.



Extension Work in Holland

By H. R. Cox

New Jersey Agricultural Experiment Station

THE kingdom of the dunes and dykes ranks high in agricultural progress. Perhaps no people in all history have so altered the character of their land in the interests of farming as have the Dutch. Nearly 40 per cent of the country is within three feet of sea level or below sea level and would be inundated if the sea broke through the barriers erected by these daring people. With a soil naturally below average in productiveness, they have turned their country into a vast area of fertile gardens and lush pastures.

Another indication of progressiveness in this nation is the efficient system of agricultural extension work which they have built. Although similar to our own in many respects, it is quite different in others. Agricultural extension in Holland has been the result of gradual growth during a period of years, taking a certain direction here and a different direction there. It does not possess, therefore, the uniformity of our own system, which was initiated by a single act of Congress and superimposed upon all the states.

Agricultural extension in Holland heads up in the Ministry of Agriculture at the Hague. The field men, who are known as consulents, represent a combination of the county agent, the extension specialist, and the vocational teacher, as we know them. These consulents are specialists in various lines—horticulture, field crops, dairying, and livestock. Practically every one of the provinces has one or more consulents. Perhaps a personal introduction to a number of these men will give a more intimate knowledge of their aims and duties than would a general description.

A piece of moor with the heather skinned off and the peat taken out for fuel.

Consider P. S. Rietsema, for example. Rietsema is one of the horticultural consulents for the province of North Holland. He is located at Hoorn on the Zuyder Zee. Here

Wild moorland being reclaimed by deep plowing, liming, and fertilizing.

there is a horticultural institute, of which he has charge, with two assistants. The institute consists of a well-equipped brick building surrounded by two acres of land devoted to vegetable, fruit, and ornamental plants. At the time of my visit the regular students in the institute consisted of two classes of 12 each. These students were boys of from 15 to 16 years of age. They are farmers' sons who come from all over the province, but largely from the vicinity of Hoorn. Certain special classes are also held at the institute for public school teachers.

In addition to these teaching duties Rietsema and his assistants attend meetings of farmers at night in various villages of the province. Experiments and demonstrations are put on both on the institute grounds and on farms. The institute plats are devoted largely to variety studies and experiments on insect and disease control. These school gardens are expected to yield a considerable money return although they are nowhere near self-supporting. Rietsema remarked, however, that one hot-house of about 75 feet in length devoted to grapes produced the previous year about $160 worth of fruit.

Farmers' meetings are held at the institute occasionally when there are interesting things to observe, and the consulent organizes tours of farmers to visit various farms in the province where demonstrations are being conducted. This province has an important seed potato industry, and Rietsema assists the producers in marketing their seed. Only a week after my visit he was expecting a group of about 16 seed buyers from Germany who were coming to inspect and buy seed.

Let me introduce also J. C. Tukker, dairy consulent for the province of South Holland, who lives in the Hague. He does not have an institute. In fact resident instruction of the institute type is confined to the field crop and horticultural lines. Tukker's duties, as I gathered, are very similar to those of our dairy specialists, except that he is able to work his rather limited territory more intensively. He does give a certain amount of or-

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Elema standing in the first crop, oats, on the reclaimed moorland.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Inspection of Commercial Fertilizers for 1927," Agr. Exp. Sta., Durham, N. H.

Soils

The effect of green manures and crop residues on soil reaction is a subject of unusual importance where excessive nitrate fixation results in unfavorable crop development. This subject has been ably treated by Sackett, Kezer, Ferguson, and Ward of the Colorado Experiment Station, in Bulletin 324.

The limits of bacterial developments as influenced by soil reaction have been quite accurately established by investigators. Nitrogen fixation by Azotobacter is most rapid with the pH between 7.0 and 8.0, and its activity is limited by a pH of 6.0 or lower.

Excessive nitrate fixation on soils relatively high in lime is frequently harmful to crops. With this in mind and the fact hydrogen ion concentration is appreciably increased by fermentation of organic materials, field and laboratory experiments were undertaken to determine the effect of different crops, residues, green manures, and fertilizer treatments on the development of soil nitrates. The crop residues were alfalfa meal, barley straw, and corn fodder; the green manures were green barley and green cane; the commercial fertilizers were acid phosphate, dried blood, and sulfur.

Results of the work for one year on soil containing 3.184 per cent of calcium carbonate show convincingly that none of the above treatments increased the concentration sufficiently to control the nitrogen fixation by Azotobacter. In fact the soil reaction was made more alkaline where the barley and cane green manures were used.

On soils rich in calcium carbonate and where excessive nitrate formation is a hindrance to crop growing, the solution involves the practice of maintaining high organic content by attention to crop residues and the growing of crops which have a relatively high nitrogen requirement.

"The Numbers of Microorganisms in Carrington Loam as Influenced by Different Soil Treatments," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 109, *Lewis W. Erdman.*

"Studies on Nitrification and Its Relation to Crop Production on Carrington Loam Under Different Treatments," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 110, *Lewis W. Erdman and Harry Humfeld.*

"Soil Survey of the Coachella Valley Area, California," U. S. D. A., Washington, D. C., A. E. Kocher and W. G. Harper.

"Soil Survey of the Gilroy Area California," U. S. D. A., Washington, D. C., Stanley W. Cosby and E. B. Watson.

"Soil Survey of Worcester County, Massachusetts," U. S. D. A., Washington, D. C., W. J. Latimer, R. F. R. Martin, and M. O. Lanphear.

"Soil Survey of Berrien County, Michigan," U. S. D. A., Washington, D. C., J. A. Kerr, N. M. Kirk, Elbert Southworth, J. O. Veatch, L. C. Wheeting.

Crops

"Asparagus Growing in Georgia," a new Bulletin 339, by R. L. Keener of the Georgia State College of Agriculture, Athens, is one of the interesting crop bulletins received this month. The increasing consumption of this delicate and appetizing product of the

garden is putting the growing of it on a commercial scale in a great many sections of the country. This naturally results in a demand for more information as to the best method of producing quality asparagus. Professor Keener has treated all the phases for such production and with regard to fertilization advises that in addition to manure or a cover crop some form of fertilizer containing a high percentage of phosphorus and potash should be used, since these elements are not supplied by either the manure or the cover crop.

Another bulletin which will create more than local interest is Bul. 553, "Better Methods of Canning Crops Production," written by C. B. Sayre of the New York State Agricultural Experiment Station, Geneva, N. Y. This is a progress report of a series of experiments which are being conducted at that station in the production for the canning factory of peas, tomatoes, sweet corn, stringless beans, beets, and cabbage for kraut. All of these crops are included in fertilizer and rotation experiments. The result shows that rotation lowered the cost of production due to larger yields and less loss from plant diseases; also, that liberal amounts of fertilizer can be applied on canning crops with profit.

Interesting information on the role of fertilizers in speeding up the canning crop in backward seasons is to be found in the "Forty-Sixth Annual Report (1926-27)" of the Ohio Agricultural Experiment Station. An advance of 24 days in the silking date was observed on one of the experimental plots.

"Irrigation of Orchards by Contour Furrows," Cir. 16, Agr. Ext. Serv., Berkeley, Cal., April, 1928, M. R. Huberty and J. B. Brown.

"Irrigation Investigations With Field Crops at Davis, and at Delhi, California, 1909-1925," Bul. 450, Col. of Agr., Mch., 1928, S. H. Beckett and M. R. Huberty.

"Sortieth Annual Report," Agr. Exp. Sta., Fort Collins, Colo.

"Impermeable Seed of Alfalfa," Agr. Exp. Sta., Fort Collins, Colo., Bul. 326, Jan., 1928, Anna M. Lute.

"Lawns for Georgia," Col. of Agr., Athens, Ga., Vol. XVI, Bul. 324, Dec., 1927, H. W. Harvey.

"Results of the 1927 More and Better Cotton per Acre Contest," Col. of Agr., Athens, Ga., Vol. XVI, Bul. 342, Jan., 1928, E. C. Westbrook.

"1927 Five-Acre Corn Production Contest," Col. of Agr., Athens, Ga., Vol. XVI, Bul. 343, Jan., 1928, E. D. Alexander.

"Iowa Corn Yield Test," Agr. Exp. Sta., Ames, Iowa, Joe L. Robinson and A. A. Bryan.

"Barley Growing," Agr. Exp. Sta., Ames, Iowa, Cir. 109, Mch., 1928, H. D. Hughes and L. C. Burnett.

"Grape Growing in Kansas," Agr. Exp. Sta., Manhattan, Kans., Cir. 134, Jan., 1928, R. J. Barnett.

American Potato Journal, The Potato Association of America, East Lansing, Mich., Vol. V, No. 4, Apr., 1928.

"Report of South Mississippi Branch Experiment Station, 1927," A. & M. College, Miss., Bul. 246, Dec., 1927, E. B. Ferris and W. S. Anderson.

"The Apple Industry of Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 418, Mch., 1928, Chas. W. Hauck.

"Early Cabbage," Agr. Exp. Sta., State College, Pa., Bul. 221, Mch., 1928, W. B. Mack.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 245, May, 1928.

"Growing Tomatoes in Texas," Ext. Serv., A. & M. College of Texas, College Station, Tex., C-62.

"Ten Years of Agronomy Extension 1915 to 1924," U. S. D. A., Washington, D. C., Cir. 22, Feb., 1928, O. S. Fisher.

Illinois Crop Reporter, U. S. D. A., Washington, D. C., Cir. 377, Apr. 1, 1928.

"Crop Report Regulations, 1928," U. S. D. A., Washington, D. C., Misc. Pub. 17, 1928.

"Preparing Strawberries for Market," U. S. D. A., Washington, D. C., Farmers' Bul. 1560, Mar., 1928, R. G. Hill.

"Source, Character, and Treatment of Potato Sets," U. S. D. A., Washington, D. C., Tech. Bul. 5, Dec., 1927, Wm. Stuart, W. C. Edmundson, P. M. Lombard, and G. W. Dewey.

"Broomcorn Experiments at the United States Dry-Land Field Station, Woodward, Okla.," U. S. D. A., Washington, D. C., Tech. Bul. 51, Feb., 1928, John B. Sieglinger.

"Sunflowers for Silage," Ext. Serv., College of Agriculture, Madison, Wis., Cir. 220, Feb., 1928, E. D. Holden and E. T. Delwiche.

Economics

Cotton prices fluctuate widely from year to year and from month to month. There are many factors that cause changes in the price of cotton. United States Department of Agri-

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Healthy Crops

(*From Page 29*)

grows rapidly. Even a severe injury such as complete defoliation may scarcely prove to be a temporary check. While there are more leaves on the heavy growths and leaf injury therefore would be less concentrated than on the thin stands, the obvious difference in the final effect of insect damage to the crop is that of vitality and recuperation.

When the chinch bugs make their annual march from the wheat fields to the corn fields, the fate of the corn crop is quickly decided. If the bugs are present in large numbers and migrate in an army, the healthiest stand of corn is soon swept before them. However, there are varietal differences and individual differences in the degree of resistance to chinch bugs. A vigorous stand of corn will survive a few bugs per plant without noticeable checking. In some years, the chinch bugs are able to finish their growth in the wheat and in that case they generally scatter by flight. This results in a more equal distribution of the bugs in the field. It is under these conditions that the vigorous stand demonstrates its recuperative powers over the weaker one.

The application of this knowledge is clear. If healthy plants suffer less damage from insect attacks than weak ones, then grow healthy crops. The growing of healthy plants involves many points, which are familiar to most every one since they are so much emphasized. Among them are good seed, good varieties, the proper time of planting, proper seed bed, method and frequency of cultivation, etc. But soil fertility and available plant food must be listed in the group of most important items. Heavy manuring or the use of the right kind of commercial fertilizer provides the proper start for healthy crops. And healthy crops will best survive unfavorable weather conditions as well as insect attacks. Then, too, they are certain to suffer less from the invasion of weeds and grasses which are the scourge of the thin, weak stand.

Combating insects by growing healthy crops is good agriculture. It is in line with soil improvement programs. It is good economics and means a better bank balance at the end of the year. It is also good insect control practice, at least with light infestations. For outbreaks, emergency measures are necessary, but the normal, usual annual drain on crops by insects and plant diseases can be adequately offset by healthy crops.

Cooperative Marketing

(*From Page 30*)

of it. His cooperative marketing association brings to his aid the very best of expert assistance in grading, packaging, and merchandising of his products. It also relieves him of the necessity of straining his credit by furnishing him his income over a long period instead of three or four months. This means that the farmer, instead of operating on costly credit, is rapidly being placed in the position where he can pay as he goes. The net result of this should be not only a continuous but a much larger purchasing power."

According to Mr. Christensen, "in cooperative marketing the farmer is capturing his former control over his

market. He will be extending the operation he controls into a complete marketing process. For many years he raised his stuff, carted it into town, and sold it to the local dealers. Now, under the cooperative plan, he is working out a very much extended development of the old plan."

In extending this selling over a period of many months, it is evident that it will cost money to hold the farmer's products. Yet it must be made plain, that some one has to do this holding and as long as it must be done, the farmer should do it.

Now with the cooperative organization, the farmer sets up his own storage and marketing system. "In truth," says Mr. Christensen, "he really hires but another hand. The cooperative really does not buy his product; it merely furnishes skilled, technically-trained experts in all of the processes necessary to the economical merchandising of farm products. The farmer cannot get his final settlement until all of his crop is sold. The elements of speculation and risk are greatly reduced, for the reason that the farmer's investment in his crop is the only investment and the cooperatives reduce to a minimum expenses of storage insurance and the like.

"In financing, the cooperative delivers one of its most valuable services. Let us say that the farmer delivers his crop in September. Within a few days, the cooperative sells 12 per cent of its receipts, and the farmer is paid for that percentage of his delivery. The balance is a commodity which provides a basis for bankable paper. The cooperative borrows on warehouse receipts, and loans are usually made up to 65 per cent of the market price of a number of products. The cooperative makes the loan and advances money to the grower."

According to recent figures there are today approximately 2,250,000 farmers in the United States which are members of cooperative associations. The future power of these cooperatives to work out their members' economic salvation is indicated by the fact that during the ten-year period of 1915 to 1925 the membership in these organizations increased more than 300 per cent.

Mr. Christensen indicated that figures are not as yet available as to just how fast the farmer is becoming an all-the-year-round buyer as is the city dweller, but there is no doubt that the records are showing that the way is opening rapidly. "From the records," he said, "manufacturers interested in the farmer's money should and are planning for this change."

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124 Bushels of Corn

The variety of yields and the conditions under which the corn is grown, has brought out many striking demonstrations in the work of the Fulton County, Indiana, Corn Club, says County Agent Harry Rosenberry. Perhaps the most striking demonstration was that of the value of fertilizer in the case of the boy who produced 124.45 bushels on his acre in a small field of three acres of heavy black soil that had been a bluegrass pasture for years. Neighbors who had farmed the same kind of land for years stated that he would not raise enough to pay for the labor. The boy observed every point to insure a yield that was within his power, namely soil fertility, good seed, and proper cultivation. He sowed broadcast with a wheat drill 300 pounds of 0-20-20 and 180 pounds of 2-12-6. He used a good strain of Reid's Yellow Dent and his cultivation was ideal, the result being a yield of 124.45 bushels per acre. Other members of the club had similar demonstrations.

Extension Work in Holland

(*From Page* 44)

ganized instruction to young farmers. This instruction is apparently similar to our method of teaching in extension schools. He is a true dairyman, knows his Holstein pedigrees for generations back, is intimately acquainted with his men, and his men seem to have great confidence in him.

You will be interested in making the acquaintance of J. Elema, consulent in field crops and soils in the province of Drenthe with headquarters at Assen. Mr. Elema is a man of about 60 years of age and has been on the job for 30 years. Can any American county agent match this record of tenure of office? Drenthe is a poor province, consisting almost entirely of upland peat or moor covered with heather. When he entered upon his duties, there was very little farming in the province. Elema set about first to find out whether the land could be economically brought into cultivation and what the best methods were of accomplishing this. After his methods had been worked out by experiment, he spread the knowledge so gained by demonstration. Today a considerable part of the moorland of this province has been brought into cultivation, and this has been largely the result of Elema's efforts. What a monument to leave to posterity! He is apparently an authority on moorland reclamation and gives a course of lectures every year on this subject in the University of Wageningen.

Briefly, moorland reclamation consists in first getting rid of the heather either by burning or by cutting it off and removing it from the field. The next step often is to plow deeply in order to bury the dead, gray, sour peat and to bring to the surface as much as possible of the moisture-holding brown peat. This step varies somewhat. Sometimes the surface peat is of such a character that it can be utilized as surface soil, and often in such cases the subsoil peat is utilized for fuel, the surface being skimmed off and thrown into the pit where the fuel peat has been extracted.

The next step in reclamation is giving liberal applications of lime and fertilizers. Elema showed me a field, for instance, which had been started in the reclamation process and which was growing its first crop, oats. It had received about 1,800 lbs. per acre of slaked lime, 900 lbs. of basic slag, 720 lbs. of manure salts, and 540 lbs. of nitrate of soda. A grass and clover mixture had been sown with the oats. The crops were making an excellent growth, excepting in certain small areas where they were yellow and stunted. It was explained that these patches were due to "improvement sickness" in the soil, which could be corrected by the application of copper sulfate solution. Although this field received no manure in preparing for cultivation, Professor Elema explained that it was highly desirable to make an application of manure at the start, in addition to lime and fertilizer, in order to introduce friendly bacteria into the soil.

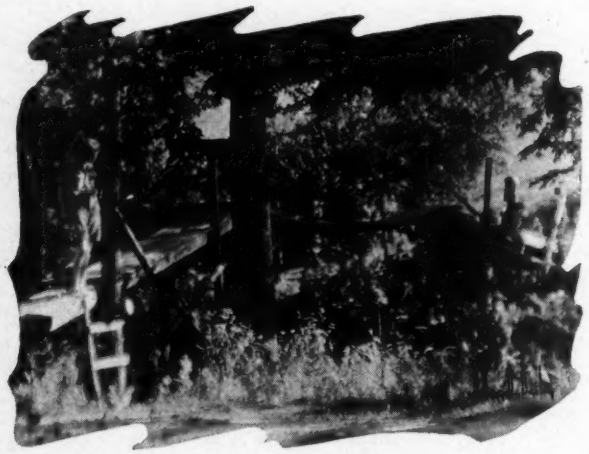
Wild heather land in Drenthe is worth from $20 to $30 per acre and these figures represent largely potential value. Pastures and meadows which have been reclaimed are worth from $200 to $500 per acre. We passed a fine piece of pasture worth at least $450 an acre, which was one of Elema's first improvement demonstrations 25 years ago.

The Dutch extension men feel that their government has been rather niggardly with them in the matter of appropriations. The lords of the treasury have been making every effort to have income match expenditure. This

has apparently handicapped some of the public servants. Many of the agricultural workers I met spoke with envy of the fine support our extension people received in this country in a financial way.

Field men in Holland start on about $1,600 a year and the limit of salary is about $2,500. These figures compare favorably with the salaries received by our own people considering difference in cost of living. Several of the Dutchmen appeared to be impressed with the propaganda methods in extension work used in this country stating that the Dutch had something to learn from us in this connection.

About half of the field men are supplied with motor cars and the rest of them travel largely on bicycles, which is the favorite means of transportation in Holland. A few of them use trains and buses. The motor car used is largely the Ford, although there are some Citroens, the popular French car, and a few Chevrolets.



Terracing

(*From Page* 28)

turn abrupt angles. It is, therefore, necessary to take the sharp turns out of the terrace as laid off by the instrument. This is done by walking along the terrace, as it should go, using the stakes set by the instrument as a guide, and having a team and walking plow follow closely, turning a furrow to mark the terrace line.

The building of terraces, being nothing more than throwing up a wide bank of earth, can be accomplished by such farm machinery as is usually found on a farm—a plow and a scraper. Other implements can be used to make the job easier and quicker, but will not do any better job than the two mentioned.

The actual construction of the terrace after it is marked off calls, first, for the plowing of the land and then moving the plowed dirt down hill to make the terrace "bank."

Terraces, like everything else, need maintenance and call for constant watching. There will be a gradual moving of the soil from the hillside down towards the terrace and the

terrace itself will tend to wash some. This is constantly going on to some degree and it is almost impossible to absolutely eliminate it. However, it is essential that it should be reduced to the minimum.

The movement of this soil, both on hillside and terraces, can be reduced to the minimum by cropping and increasing the soil fertility. It is, therefore, essential that the terrace be planted in some profitable crop. Such crops as will develop a vigorous root system are, of course, better than those that will not. The terrace should not be allowed to grow up in weeds as this is not only bad agriculture, from the standpoint of having waste land in the middle of the field and producing weed seeds in the midst of a crop, but it is also very unprofitable.

The movement of this soil to and from the terrace makes it necessary each year to throw some dirt to the terrace by plowing out the waterway on the upper side and throwing this to the terrace. Weak places in the terrace where large bodies of water are liable to concentrate should be constantly watched and protected.

There is no more difficult problem in terracing than that of disposing of the water at the end of the terrace. If this is not properly done, gullying is very apt to result, particularly when there is a drop from the terrace into the ditch.

There are a number of methods of disposing of this water, for example, into the side ditches, open ditches, roadside ditches, sink holes, ponds, and through tile drains.

The use of side-hill ditches is the most common and where this ditch is to be constructed just for the purpose of taking the terrace water, it must be laid off with considerable care and its location selected after thorough study. It will be necessary to give it more fall than the terrace itself, hence, it will erode and tend to cut more or less into a deep ditch. This cutting can be controlled to some extent by giving width. However, any kind of ditch on a farm is always waste land, and the side of it is important.

It is to the advantage of the farm, also, to get this ditch as straight as possible. In turning the terrace water into this ditch if there is any drop to speak of, some method such as described in the eradication of gullies should be provided to drop the water from the elevation of the terrace to the bottom of the ditch and thus protect the terrace from gullying.

Taking the Water Away

Open ditches, creeks, branches, and small streams are often available to be used as outlets for terrace water. The terrace should be protected the same for them as in the other cases.

Farm roads, public highways, and railroads are often so located as to allow their side ditches to be used for disposal of terrace water, and in some cases it is possible to relocate the farm road so its ditch can better take care of this water.

Sink holes that will take the water and carry it away through some subterranean channel are found in some sections of the country. It may also be possible to get an outlet through vertical drainage outlets, which are described in some articles on terraces.

Ponds as well as gullies which are being eradicated by the natural method offer excellent outlets for terrace water in that they collect water and allow it to deposit silt before falling to lower levels.

The use of tile drains for terrace outlets has been successfully used in a

number of instances. This method is only adapted to cases where the land terraced is of small area or is so expensive that it makes a number of open ditches out of the question. In using this method the water is carried from the terrace down the hill through tile drains and emptied into an open ditch or some other outlet.

The tile is usually run at right angles with the terrace and, going straight down the hill, has considerable fall, hence, its carrying capacity is greater than is usual in the case of tile drains for fields with flatter grades. Surface inlets are so placed in the terrace as to allow the water to go into the tile. These inlets should have a greater cover and it is desirable to put some other protection around them in the form of wire screen to keep the debris or trash from stopping up the openings. The terrace at this point should also be thrown up higher for some distance on either side, in order to form a reservoir to hold the water during a big rain until the tile can handle it. This same tile can be used to drain one or more terraces. The author has used this system not only to drain the terrace, but also to clean up seeping hillsides.

Sprouted Oats

(*From Page* 19)

While the work of Dr. Evans suggested the feeding of sprouted oats to non-breeding dairy cows and heifers, it does not follow that the good results obtained are due to the vitamin factor, says Mr. Graves. Enough investigation has not yet been carried on to determine the reason for its good effects; sprouted oats, however, have been reported to be one of the abundant carriers of vitamin E.

Poultrymen have long practised feeding green feed to increase egg production, and results have been successful. But the practice is based on practical results rather than on the belief that a specific vitamin is present; no experimental tests have ever been made to determine the scientific reason for the value of green feed for poultry. It is, however, a practice that simulates summer conditions—a time when green feed is plentiful and egg production is normal.

The beneficial effects secured by feeding sprouted oats to dairy cows may likewise be due to the simulation of normal breeding conditions, says Mr. Graves. Animals in their undomesticated state have a normal breeding season closely allied with the spring flush of new grass. Under modern methods of management dairy cows and heifers are bred at all times of the year. Many of the breeding troubles may be due to functional disorders brought about by a high state of domesticity in which the natural breeding season with its attendant green feed is ignored. The feeding of sprouted oats, which is much like a green feed, may owe its beneficial effects to the fact that normal dietary conditions of the breeding season are brought about at an abnormal breeding season.

At the Federal dairy farm the oats are sprouted in an ordinary poultry oats sprouter. The mat of sprouts is broken up into convenient sized pieces and fed in adequate amounts, usually about 3 to 5 pounds per head daily. The cows are put on the feed and continue to receive it until conception takes place. Some cows require a much longer feeding period than others.

Potatoes in Wisconsin

(*From Page* 17)

most profitable fertilizer to use under his particular conditions.

John Omernik, County Agent of Langlade county, under whose direction these tests were run, is a strong believer in test plots, and only lack of time prevents him from doing more trial plot work. The growers are also keenly interested. They should be since their bill this year amounts to nearly $100,000 for fertilizers, a large part of which is used on the tuber crop.

While it is important to know the kind of fertilizer to use, it is also quite essential to know how to apply fertilizer. At our Spooner Experiment Station a study of the "how to apply" was undertaken in 1927. The soil is a sandy loam, well adapted for spuds. No manure was used, but a complete fertilizer testing 4 per cent nitrogen, 8 per cent phosphoric acid and 6 per cent potash was used at the rate of 750 lbs. per acre. The method of application and yields per acre of No. 1 potatoes are indicated in table 2.

Table 2

(1) 750 lbs. under seed piece	153 bu.
(2) 750 lbs. on side and same level as seed	152 bu.
(3) 750 lbs. over seed piece	145 "
(4) 750 lbs. in contact with seed piece	87 "
(5) No fertilizer	94 "

The tuber crop is very susceptible to fertilizer injury. Plot 4 suffered severly due to close contact of fertilizer with seed pieces. This plot had many missing hills. On plot 3 the fertilizer was applied over the seed piece separated by 1½ to 2 inches of soil. A good yield of No. 1 stock resulted. Where fertilizer is placed below the seed piece or on a level with it, maximum returns were secured.

Unfortunately not all planters distribute fertilizers so as to get the maximum benefits. Manufacturers have been making improvements on their fertilizer attachments and planters are now built which place the fertilizer so as to get the most possible from it. In selecting a planter consideration should be given to the method of distributing fertilizers. Not only "what to apply" but also "how to apply" must be considered to the end that the fertilizer dollar may perform its full duty.

Smith-Hughes Projects

(*From Page* 15)

to use them for the best results.

In his feeding work, he has learned that ensilage is a very important part of the winter ration of the dairy cow, and so as a part of his course in farm mechanics, he convinces his father that a silo on the farm would prove a paying investment and helps to build the silo as a part of his project in farm mechanics.

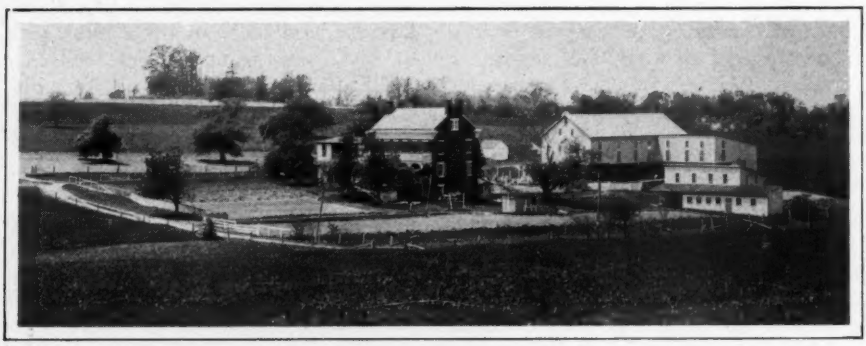
In the meantime, he has become a member of the community, not merely an onlooker, as many young folks are, but an actual cooperative member, borrowing money from the bank for worthy purposes and depositing money from cream and milk checks or surplus stock sold. He has become a part of the community, with a business interest in its and a feeling of responsibility for its progress.

Keeping his project records has taught him the fundamentals of farm bookkeeping. Then during his last years, when he studies farm management and economics and ends with a

course in special economics, he is ready to step right into the community as a vital part of it. The way in which some boys are cut adrift from the community the morning after they graduate leaves small wonder that they are lost to the farm.

I could point to scores of young farmers in Michigan as proof that their high school project work has kept them on the farm. In fact, there are several such young farmers that I should like to get into the teaching ranks, but they prefer the farm and the business they have built up. It will be seen that when such a young fellow graduates, he either has a purebred dairy herd with a silo and an acreage of alfalfa on the farm, or he has started a business in purebred seeds that anchors him to the farm and the home community.

The challenge to ever-increasing responsibility, providing the boy with a permanent farm laboratory to test his class work, inculcating in him a love for Nature, and interesting him most vitally in his home farm community are the things that we emphasize in the Smith-Hughes project work in Michigan.



America's Markets

(*From Page* 14)

important markets and the news flashed over leased telegraph wires from coast to coast and border to border.

Utilization of all these services and improved terminal facilities will help reduce marketing costs, declare the economists, but if farmers want immediate results, they must reduce production to the market demands. They must decrease costs of production through better arrangement of the farm enterprise as an individual unit and greater efficiency per man as brought about by increased yields per acre and the economical use of machinery to replace expensive hand labor. The combine harvester, the corn picker, the cotton sled and picker, the tractor, the potato harvester, and similar machinery are revolutionizing farm production methods and must inevitably reduce production costs.

Until comparatively recently, farmers had no means of knowing the volume of consumer demand and the other factors which control prices of their products. They had no basis on which to plan production with the inevitable result that in years of good prices they increased acreages the following year and saw their profits dissipated. Now, through the "outlook reports" of the Department of Agri-

culture and the State Extension Services, they are apprised of the factors which control farm returns and can order their production in accordance with those factors.

It is appreciated that it is not always practicable for a farmer arbitrarily to make radical changes in his production program. His farm is organized with machinery and other equipment to handle a certain number of acres of crops or head of livestock. When the Federal outlook report, for example, suggests that the total acreage of corn should be reduced 10 per cent, the individual farmer may not be in a position to apply such a reduction to his own farm without disorganizing his individual farm system, nor is it the notion of the Department of Agriculture that he should do so.

The national "outlook report" is intended for consideration by state agricultural agencies from the viewpoint of state needs as a part of the national program. The Federal reports, therefore, are prepared by the full staff of economists and marketing experts of the Bureau of Agricultural Economics with the cooperation of representatives from the State Extension Services. The extension agencies subsequently consider the Federal report in conjunction with individual state requirements, and issue state outlook reports. These in turn are interpreted in some states in the light of county and sectional needs within a state, and finally in terms of individual farm prospects.

Cooperative marketing in many cases is proving an effective means of securing marketing economies. But whether farmers market cooperatively or individually, the needs of agriculture seem plain. They are:

(1) PREVENT SURPLUS PRODUCTION.

(2) IMPROVE DISTRIBUTION.

Illinois

(*From Page* 10)

Illinois, the increases in the annual acre income were $12.31 for limestone applied in addition to manure and $10.05 when it was used in connection with sweet clover.

Acre values of the added crops yields resulting from the use of manure ranged from $1.58 to $9.63 for the different experiment fields, while the ton values of the manure ranged from 53 cents to $7.45.

Crop residues grown on the Illinois soil experiment fields and returned to the land have increased the annual acre value of the grain crops all the way from 2 cents on one field to more than $7 on another field, as an average for the rotation period ending in 1927. These increases were obtained without the influence of any other soil treatment practices.

Phosphoric acid, another of the "planks" in the Illinois system of permanent soil fertility, has given variable response. As an average for the rotation period ending in 1927, the ton value of rock phosphate in terms of crop response on the soil experiment fields varied from less than nothing on one field to $23.96 on another field, when used in addition to manure, and from $1 on one field to $41 on another field when used in grain systems of farming.

Potash Importance

Potash, too, has come in for its share of attention in the systems of soil management being studied on the experiment fields. Results for the rotation period ending in 1927 indicate that both dark and light colored soils may give increased yields through the use of potash. Practically all the light-colored soils yielded better when potash, used in the form of kainit, was put on them. The value of the crop increases ranged from $1.89 an acre annually on one field to $8.75 an acre annually on another field. On

the dark-soil fields, the increases ranged from nothing to $4.98 an acre. These increases were obtained from 200 pounds of kainit an acre annually, applied in addition to the use of residues, sweet clover, limestone, and phosphate. Since the cost of the kainit in this combination would be in the neighborhood of $2.50 an acre an application, it is clear that the use of potash in this way has been profitable on some fields.

That legumes, upon which much stress is laid in the Illinois system of permanent soil fertility, have been a forceful factor in swelling crop yields on the experiment fields is indicated by the results for the last rotation period. Results from the historic Morrow plots also multiply the evidence in favor of legumes. Unfortunately, the specific effect of rotation legumes on the yield of grain crops on the experiment fields can not be definitely measured because of the tie-up between the legumes, crop residues, and limestone.

A 900% Variation

One of the interesting things met in adapting the system of permanent fertility to the many different types of soil in the state is the finding that Illinois farm lands vary as much as 900 per cent in natural productiveness and more than 300 per cent in profitable response to various soil treatments. Evidence of this is found in the summary of the results from 28 of the soil experiment fields for the rotation period ending in 1927. No matter how productive the individual fields were, however, profitable response was obtained from some soil treatment practice. Organic matter in the form either of manure or crop residues paid on all the fields. Limestone paid on most fields and while phosphate and potash were factors of less importance, they were highly profitable on some fields.

Basic in the work of the agronomy department has been the state soil survey. A general survey was completed in 1907 showing the 14 great soil areas of the state and giving an invoice of the stock of fertility in 25 of the main types of soils in these divisions. A more detailed survey is now well along toward completion. In this detailed work, an effort is being made to discover, map, and investigate each different kind of soil on each farm in each county, even down to five-acre lots. Up to the close of the season on January 1, 1928, 101 of the 102 counties of the state had been covered in this detailed survey. The most profiable uses and treatments for Illinois farm lands, as well as their fundamental character, are being decided upon from the findings of the survey. Extended studies are planned of such practical problems as where to use the various phosphates and on what soil types potash may profitably be used.

Some estimate of the stress which the Illinois station is now placing on soils and crops work can be made from the fact that the agronomy department alone is responsible for 66 projects, or separate pieces of work. This is a bigger program than is being carried by any other department of the station. The work in agronomy is now divided under the heads of soil fertility, soils physics, soil biology, plant breeding, crop production, experiment fields, and grain marketing.

The Illinois animal husbandry department is perhaps the first real comprehensive one that the country had. Herbert W. Mumford, who spent 21 years in developing it before he was appointed dean and director, recognized the impossibility of one man being a specialist in all fields of livestock production and accordingly sought specialists in animal nutrition, beef cattle, sheep, horses, and the various other lines and gave them the time and opportunity to become experts in their line.

It follows only naturally that the Illinois station is rather generally recognized as having done more than any other one in the country to make the beef cattle feeding business a suc-

cess. Professor Mumford inaugurated the practice now common with all experiment stations of using carload lots instead of just a few cattle in feeding experiments, thereby overcoming the inadequacy of the results from these feeding trials.

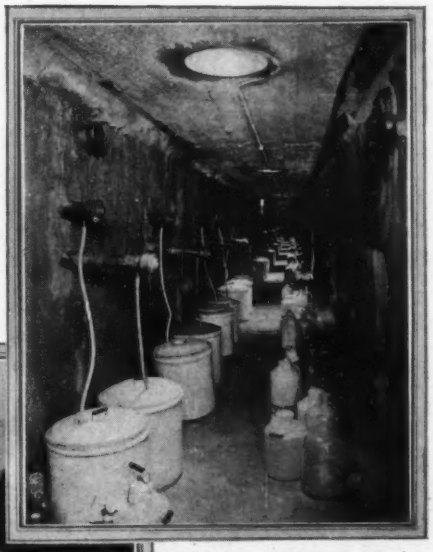
Early feeding experiments of the station showed the value of silage in the wintering of beef cows and calves. They also showed that a roughage of clover hay made it possible to get $8.71 more profit a steer than was possible when timothy hay was fed. At the time, this finding was worth about $250,000 to the cattle feeders of the state.

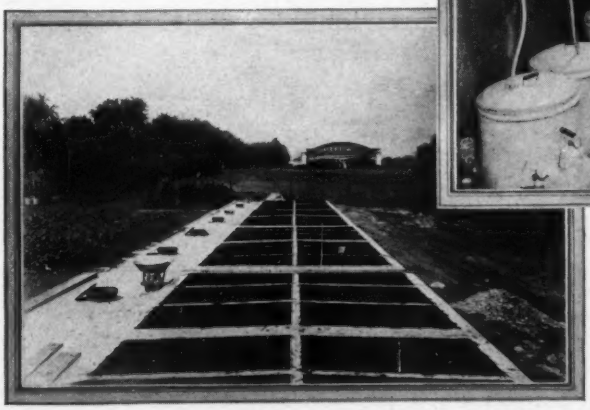
Swine Feeding Standard

A new swine feeding standard worked out more than 20 years ago by the Illinois station made it possible to produce a hog 60 pounds heavier at eight months of age and on but little more total feed and less feed per 100 pounds live weight than was required under the old standard. When this finding was announced, it was estimated that there were more than 2,000,000 hogs produced annually in the state. It was calculated that an extra 60 pounds on each at 5 cents a pound would mean a gain in gross income of $6,000,000 annually to the farmers of Illinois and upwards of $134,000,000 to the swine growers of the United States, considerably more than half of which would be clear profit.

In the early days of the experiment station, many sheep feeders believed that hay should form a considerably larger part of the ration than grain. The station showed, however, that the reverse was true and that the most economical results were secured when the proportion of these feeds was 1 to 1. It also demonstrated that where a 60-bushel-an-acre corn crop was fed to lambs, $3.75 an acre could be saved by feeding shelled corn and clover hay rather than by supplementing the corn with oil meal.

Professor Mumford also did pioneer work in standardizing market classes and grades of livestock. The series of bulletins on the market classes and grades of cattle, swine, sheep, and horses, which he prepared after much investigational work on the Chicago and other livestock markets, was the only one of its kind and naturally was hailed as a valuable contribution to





ABOVE: Where the drainage water from the bins is collected as part of the study on the gains and losses of nitrogen.

LEFT: The soil bins where the gains and losses of nitrogen can be studied.

animal husbandry literature.

Among the more recent results of the station's nutrition studies are the first published chemical analyses on the carcasses of horses. This particular study was prompted by the fact that the only absolute measure of an animal's requirements for food is the amount of nutrients actually built up into its own tissues. By analyzing a large number of horses of varying age it is hoped eventually to be able to plot curves of increasing weights of protein, calcium, energy, etc. with age, from which may be computed the daily gain in nutrients during normal growth. These, then, may be taken as measures of the daily requirements for feed.

In connection with studies on the quality of meats, the nutrition authorities of the Illinois station not only have worked out a chemical method for measuring the toughness of meat, but also have established the fact that the tougher the meat the less nutritious it is.

Condensed Buttermilk

The Illinois station was one of the first to prove that calves and hogs are susceptible to fowl tuberculosis, thus definitely indicting chickens and certain other types of birds for the first time as a source of danger to cattle and swine. The same Illinois investigators also obtained evidence that chickens having contact with tubercular cattle may temporarily harbor the bovine type of the disease and thus keep alive the infection on the premises.

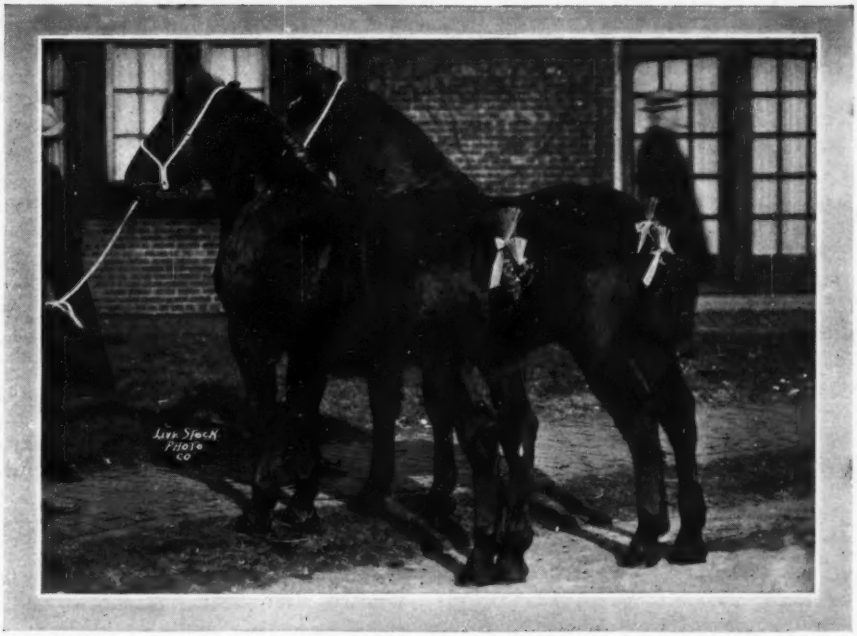
Hopes for clearing up a hitherto obscure but serious disease of pigs recently were brightened when animal pathologists of the Illinois experiment station succeeded for the first time in reproducing the ailment experimentally by feeding pigs moldy, inferior corn, indicating that clues to the cause and nature of the trouble had been established. The disease, known as vulvovaginitis, was unusually prevalent and severe in Illinois and surrounding states in 1927.

Illinois is a prominent horticultural state and naturally fruit and orcharding investigations have a prominent place in the work of the experiment stations. Research methods had never before been applied on so large a scale as in the case of the studies which the station conducted almost 30 years ago on bitter rot, curculio, dust spraying, codling moth, and spraying-in-the-bloom. Investigators of the station not only discovered for the first time in history the cause of bitter rot, a disease which in 1900 was estimated to have destroyed one and a half million dollars worth of apples in four counties alone, but furthermore, by 1903, had worked out most of the life history of the fungus and demonstrated that 96 per cent of the fruit might be saved by four thorough sprayings with Bordeaux mixture.

More recently 34 new possibilities of apple varieties and 15 new ones of the peach have have been developed by plant breeders of the horticultural department; extensive experiments are under way to help the many truck gardeners of the state find some substitute for manure, the supplies of which are dwindling; and the work in the several other divisions of the horticultural department has been extended to benefit fruit growers, florists, and gardeners alike.

The dairy department alone has been responsible for enough new discoveries and facts to bring about almost revolutionary changes in farming and yet this department is only one of the six major ones of the experiment station. The now widely-used method of condensing buttermilk was worked out by this department. Just recently it worked out a system of making condensed buttermilk out of skimmilk.

The Illinois station was the first one in the country to work out in dollars and cents the economic difference in the production of cows and put it in such comprehensive shape that it had a practical application to every dairy



First-prize Percheron stallion and filly foals at the 1927 International Livestock Exposition. They were bred and shown by the Illinois Agricultural College.

farm. This pioneer work revealed that under ordinary farm conditions the cow producing 5,000 pounds of milk and 200 pounds of fat in a year makes her owner only about one-fourth as much profit as the cow giving 8,000 pounds of milk and 320 pounds of fat. Thus, a 60 per cent increase in production means a 400 per cent increase in profits.

Advisory Board

Farm mechanics, farm organization and management, home economics and agricultural economics comprise the newer departments and divisions of the Illinois experiment station. Investigations now in progress under these heads give promise of yielding results equally as significant and important as those from the older departments.

Not all of the station's work is carried on at Urbana. Some 30 or more soil and crop experiment fields are maintained in different parts of the state, the Cook county truck experiment station provides an opportunity for extensive experiments right in the heart of the state's richest truck gardening section, while practical orcharding problems are being worked out in a commercial orchard maintained at Olney.

One of the unique things in the organization of the Illinois station which has since been developed and expanded was a board of nine directors which became simply an advisory board the same year that Director Davenport was appointed. Instead of this one advisory board there are now eight committees of advisers, all shrewd men and some scientifically trained, directing the experiments toward the problems of greatest importance and keeping them from becoming academic. Members of these committees constitute a very considerable group of men representing all lines of agriculture and coming from practically every section of the state. They have first hand and rather intimate knowledge of the work of the station. Furthermore, at least once a year the

members of the staff present to these several groups the status of their investigational projects.

These committees serve without pay, except that their expenses are paid to called meetings. Their function is chiefly advisory and in no way do they attempt to usurp the official prerogatives of the Board of Trustees. There are two committees for the agronomy department, one for crops and a second for soils; and one each for animal husbandry, dairy husbandry, farm mechanics, farm organization and management, horticulture, and floriculture.

Early investigations of the station were under the joint supervision of George E. Morrow, professor of agriculture, and Thomas J. Burrill, professor of botany and horticulture. It was not until 1895 that the position of experiment station director was created. From 1887 to 1891 Dr. Peabody, regent of the university, served as president of the experiment station board of direction. Professor Morrow was president of the board from 1891 to 1894. During that fiscal year, 1894-95, Professor Burrill served as president of the board of direction. The following year Eugene Davenport was installed as first director of the station.

Director Davenport retired as dean and professor emeritus in 1922, and today lives in a reconstructed modern home just across the road from the site of the old log house in which he was born. He came to Illinois when the state was without a college of agriculture except in name and remained to change aimless sentiment into organized effective effort and direct it toward a definite objective, the development of a real agricultural college.

Herbert W. Mumford was appointed dean and director to take the place left vacant by the retirement of Davenport.

Reviews

(*From Page* 46)

culture, Technical Bulletin No. 50, Jan. 1928, "Factors Affecting the Price of Cotton," by B. B. Smith, is not only a study of these factors, but also of the degree to which each one affects the price. Large crops of cotton depress the price. Not only is the price per pound lower, but the total value of the crop is smaller when the production is large. Supply factors, that is, the size of the crop, carry over, etc., are the most important factors in causing changes in cotton prices. The long-time growth or increase in demand due primarily to increase in population is an important factor in causing price changes. According to this study, more than 90 per cent of the monthly fluctuations in the actual price of cotton can be accounted for by several factors of supply, domestic and foreign consumption, the general commodity price level, and business conditions.

Circular No. 18, "The Agricultural Situation in California," prepared by the staff of the College of Agriculture, University of California, presents a picture of the present status and outlook for fruit and livestock enterprises in California. In general, the fruit crops have apparently been overplanted and as a result are now in an unfavorable position. Some of the livestock enterprises are in a relatively favorable position, especially beef cattle and sheep.

"An Economic Study of Potato Farming in the Hastings Aera for the Crop Year 1925," Agr. Exp. Sta., Gainesville, Fla., Bul. 193, Feb., 1928, Bruce McKinley.

"Rural Changes in Western North Dakota," Agr. Exp. Sta., Fargo, N. D., Bul. 214, Jan., 1928, E. A. Willson, H. C. Hoffsommer, Alva H. Benton.

"Vegetable Statistics, Year Ended December 31, 1926," U. S. D. A., Washington, D. C., Statistical Bul. 22, Jan., 1928.

Diseases

Six diseases of cotton, the most important money crop of the South, and means for their control are discussed in Mississippi's new Bulletin 248, by D. C. Neal of the Mississippi Agricultural Experiment Station. In line with the growing interest on the part of scientists in the importance of nutrition in control of plant diseases, it is interesting to note that in the case of three of these important cotton diseases, proper fertilization is recommended as a very effective control measure. In the case of wilt, it is recommended to use balanced fertilizer; for rust, to use potash fertilizer; for sore-shin to fertilize the plant liberally.

The writer is of the opinion that "it is essential that plant food deficiencies be corrected for the proper control of certain cotton diseases. Particularly is this true regarding potash for the control of rust. In overcoming rust development and subsequent defoliation of the plants, the writer is also strongly of the opinion that we increase their resistance to attacks by other diseases, especially wilt and Alternaria leaf-blight."

"Strawberry Leaf-roller Control," Agr. Exp. Sta., Ames, Iowa, Cir. 110, *Mch.*, 1928, *B. B. Fulton and M. H. Brunson.*

"Killing Field Bindweed with Sodium Chlorate," Agr. Exp. Sta., Manhattan, Kans., Cir. 136, *Mch.*, 1928, *W. L. Latshaw and J. W. Zahnley.*

"The Control of Sorghum Kernel Smut and the Effect of Seed Treatments on Vitality of Sorghum Seed," Agr. Exp. Sta., Manhattan, Kans., Tech. Bul. 22, *Feb.*, 1928, *C. O. Johnston and L. E. Melchers.*

"Results of Seed and Legume Inoculant Inspection for 1927," *Agr. Exp. Sta., New Brunswick, N. J., Bul.* 466, *Jan.*, 1928, *Jessie G. Fiske.*

"Black-leg Disease of Brussels Sprouts, Cabbage, and Cauliflower," Agr. Exp. Sta., Geneva, N. Y., Bul. 550, *Dec.*, 1927, *E. E. Clayton.*

"Midsummer Sprays for the Peach Cottony Scale," Agr. Exp. Sta., Geneva, N. Y., Bul. 552, *Feb.*, 1928, *S. W. Harman.*

"Increasing Stands from Vegetable Seeds by Seed Treatment," Agr. Exp. Sta., Geneva, N. Y., Bul. 554, *Mch.*, 1928, *E. E. Clayton.*

"Control of Dodder in Lespedeza," Agr. Exp. Sta., Knoxville, Tenn., Cir. 22, *Apr.*, 1928, *S. H. Essary.*

"Save the Beans," U. S. D. A., Washington, D. C., Misc. Pub. 16, *Feb.*, 1928.

"Chemical-Dust Seed Treatments for Dent Corn," U. S. D. A., Washington, D. C., Cir. 34, *Feb.*, 1928.

"Spraying versus Dusting," Agr. Exp. Sta., Madison, Wis., Res. Bul. 82, *Feb.*, 1928, *John E. Dudley, Jr., and C. L. Fluke, Jr.*

Insects

"Three Shade Tree Insects," Agr. Exp. Sta., Fayetteville, Ark., Bul. 224, *Apr.*, 1928, *W. J. Baerg.*

"Poison the Cotton Boll Weevil Coming Out of Hibernation," Agr. Exp. Sta., Gainesville, Fla., Press Bul. 405, *Apr.*, 1928, *Edgar F. Grossman.*

"The Japanese Beetle," Ext. Serv., University of Maryland, College Park, Md., Information Card No. 20, *Apr.*, 1928, *Ernest N. Cory.*

"The Food of Orchard Birds with Special Reference to the Pear Psylla," Agr. Exp. Sta., Geneva, N. Y., Bul. 549, *Dec.*, 1927, *T. T. Odell.*

Politics

(*From Page* 4)

smells of scorched reputations and singed sole leather.

The only survivors of that era of enthusiasm are the politicians themselves. The show goes on even if the actors lack an appreciative audience.

The last statement must be qualified. The comedians and tragedians on the political stage this summer may not have as appreciative or as discriminating an audience as in prior times, but they can stand before the microphone and reach thousands temporarily where they used to be content with

boring hundreds indefinitely.

In regard to the radio chain system of relaying speeches to the homes of those owning receiving sets, much can be said pro and con. When you and I were kids and were squeezed into a seat on a hard bench during the Victorian era of campaign gusto, we simply had to stay for the evening, no matter how little we relished the performance or appreciated the privilege of seeing and hearing a "nation maker." The orator was as sure of his audience as he was apprehensive of the No. 3 eggs they might have brought along for emergencies.

THEN there was usually present some obstreperous heckler who had made a mark in the local forum and liked to try his rhetoric on the occasional campaigner who happened to give him an opening. These discussions, mingled with the hoots of the gallery gods, halted the proceedings and marred the dignity and decorum of statecraft. A radio voice cannot be argued with or heckled. A radio speaker is safe from personal assault. He can take any number of hot shots without himself becoming a target for shop-worn groceries. Yet the mere flip of the dial a few centimeters to the right or left cuts out the campaigner's clarion voice and turns the peroration into syncopation.

This is imbibing political curatives by the absent treatment. Its successful application depends upon the verbal magnetism of the speaker and his brilliance in making the most of brevity. It does away with the visual appeals to pride and prejudice such as the Prince Albert and the flowing tie on the one type, and pink suspenders and cow-hide boots on the other kind. The stage manager and property man have certainly lost their jobs in the making of our congressmen since the hard-boiled radio announcer has stepped in to upset their psychology. Campaigns are now carried on direct from the larynx to the tympanum without a lot of intervening distractions.

But when the skulls at both ends are *all bone and a yawn wide,* there will be no votes changed by the wireless. Modern science is a servant to brains, but it affords no substitute for them.

It is no new truism in politics that a big cyclone of popular clamor does not indicate which way the wind is blowing. History shows that the quiet front porch and stay-at-home nominees gather more moss and less cinders than the perspiring tourists who orate from parlor car platforms. If men are likely to dig their graves with their teeth by overeating, they are just as apt to blast their hopes with their own breath by overtalking.

STEPHEN A. DOUGLAS tried the gallivanting stunt in 1860 and failed. Abraham Lincoln stayed at his Springfield cottage. Andrew Johnson swung around the circle and then came near being impeached. Horace Greeley went galloping over the Middle West in 1872, while General Grant stuck to the White House and didn't have to pack his trunk. Blaine capered around as the plumed knight in 1884, and Cleveland went fishing and took the popular vote. Bryan went roaring night and day through two presidential campaigns, while McKinley shook hands with guests on his Ohio lawn. Taft traveled fifty pounds off himself in 1912, and Woodrow Wilson stayed at home and oiled up his typewriter. The hardest work that Calvin Coolidge did in 1924 was to pitch hay for the movies.

If the shorter ballot and fewer elections are required to bring out the voters, then shorter speeches and fewer travelogues are probably the key to success for the nominee to high office. He must learn that it is easier to talk one's self into trouble than it is to keep still and keep out of it.

Particularly is this true of a non-magnetic wind-jammer. His place is at home. His shortcomings would only be intensified by his long-goings.

I must not go too far astray. My subject is politics, not politicians. My text is found in the etymological gospels according to Noah Webster, on page 1108. Here it is at last, hiding between "police" and "polka." Derived from the French and Greek vocabulary, the word "politics" has at least in our sense two distinct meanings.

First, politics is the science of government, that part of ethics having to do with the regulation of a nation or state, the preservation of its safety, peace and prosperity, the defense of its existence and rights against foreign control or conquest, the augmentation of its strength and resources, and the protection of its citizens in their rights with the preservation and improvement of their morals.

Second, politics is the management of a party, the conduct and contests of parties, and the advancement of candidates to public office.

In other words, the first part is the task to be done and the end to be sought; while the second section refers to the tools that must be used to perform that task and gain that end.

JAMES RUSSELL LOWELL puts it this way: "Swiftly the politician goes; if dark, he *borrows* a lantern. Slowly the statesman and sure, guiding his step by *the stars.*"

Yet lanterns are obsolete, and stars are rather nebulous things to guide a groundling who would build more stately mansions for a generation with noses to the grindstone. So where do *we* come in?

Well, glance over the first and best definition again, and cheer up! When you and I carry out our honest intentions to make our homes brighter, better, and broader; when we treasure our opportunities to act uprightly as parents and free-holders in fee simple; when we plan a bit today; do a little more tomorrow; keep good morals and public spirit alive at our hearthstones; and put patriotism above pelf—what are we doing? Simply playing politics in its soundest sense, and all unconsciously.

But when we and our children forget to be broad, well-informed, open-minded, and alert to problems of mankind and society; when we let somebody else choose the servants that we pay our taxes to help maintain; when we say that it's all a rotten mess and we're too busy to think about it—what then? Well, then and there we find the reason for half the failures in a republican form of government.

If we are right in worrying somewhat about the large percentage of so-called illiterates, who cannot read or write our language, are we not equally justified in having great concern about the lazy-minded illiterates among us who can read fluently but who seldom do? Free education is part of our political system, yet thousands of people have received the bountiful benefits in this line at public expense and still grub along through their sordid lives without one iota of consideration for the common

weal. King Lear's reference to the ingratitude of children could be applied truthfully to them.

Ignorance, indifference, and inertia claimed at least twenty-eight million qualified voters of the United States at the 1924 national election. This represented two million more people than the total of those who cast ballots for president in that election. The stay-away voters of that year numbered more than all the inhabitants of the nation at the time when our own fathers reached their voting majority. Maybe the voting that we reliable citizens did by proxy for them four years ago solved the question in a wiser way than if they had polled their preferences.

YET it isn't as simple as all that, either. I have a languid friend, well-versed in science and art, a student and a thinker. He has seldom voted and presumably he is better able, or thinks he is, to register sound decisions on public matters than I myself. A few blocks to the south live the newly naturalized aliens, clannish and sullen, courted by the ward boss and driven to the polls in swarms. I presume they vote right sometimes, but being boss-led, they vote wrong most of the time. Yet they register, qualify, and are on the job when the polls open at six o'clock. My cultured friend is *morally* wrong in his attitude I am sure, while they are *legally* right and merely *unmoral* in their voting. What is required in our country is something to make the voters get right both legally and morally in respect to the franchise and the duty that lies far deeper than the slot in the ballot box.

Qualifications to the ballot as such alone do not touch the root of the matter. To drag a few more "qualified" voters to the booth does not drive the demagogues out of democracy or stop the manufacture of issues out of tissues.

Ordinary candidates and parties conceive neither issues nor ideas. These are forced upon them by certain dominating groups, classes, organizations, and agencies.

EXTRAORDINARY candidates and parties who do originate some startling issue have all the ancient foes of liberal thinking to deal with. Inasmuch as liberal thinking produces more sweat and sorrow than the other kind, the liberals have a hard time of it.

Liberality of thought and liberty of living are by rights the cornerstone of our political faith, but the complexity of modern pressure makes either one increasingly harder to maintain.

Many an honestly intentioned man has sought office richly endowed with the former and imagining that he possessed the latter. In order to win he had to placate, quibble, dodge, and compromise. We ourselves not only tolerated this abuse of him, but we helped shovel coal into the steam punch that flattened him down to the shapeless pattern of a thoroughly customary and acceptable candidate. By our own sneers at politics and our avowals that all politicians are corrupt we "made him what he is today—I hope you're satisfied!"

I doubt if we *are* satisfied. That's where our native liberalism crops out above our smug complacency. We know that the phrases, "I told you so," and "Oh, I'm wise to that," have combined to put skepticism and doubt into the saddle of our politics.

Don't we need to take a fresh hold, a deeper breath, and a stronger resolve? Don't we need to give some men a chance to become statesmen instead of brow-beating them by ridicule and indifference into puppets of the ward boss? Don't we need to recognize the fact that much progress *has* been made through intelligent politics, and that if we hope for more of it we must train our offspring to think right even if we are too feeble to begin ourselves?

OBEYING HIS ORDERS

A negro soldier in the American Army was on sentinel duty for the first time in his life. A dark form approached.

"Halt!" he cried in a threatening voice, "who are you?"

"The officer of the day."

"Advance!"

The officer advanced, but before he had proceeded a half dozen steps the sentry again cried, "Halt!"

"This is the second time you have halted me," said the officer. "What are you going to do next?"

"Never you mind what ah's going to do next. Mah orders are to call 'Halt' three times, den shoot!"—*Exchange.*

NONCHALANCE

A college student arose from his table in a fashionable dining-room and walked toward the door.

He was passing the house detective at the entrance when a silver sugar-bowl dropped from his bulging coat.

The guest glanced calmly at the officer, then turned with an expression of polite annoyance toward the occupants of the room. "Ruffians," he said. "Who threw that?"—*Standard Chapparel.*

"George," said old Angus McTavish, to the ancient colored man of all work on the farm, "ye hae served us verra faithfully these thirty years, an' frae now on we will regard ye as a member of th' family. As such, ye'll receive no more wages."

A DOGGONE GOOD STORY

There was a man who had three dogs. One evening when he came home he found all three of them asleep on his couch. He whipped them and drove them away.

The next night, when he came home, the dogs were lying on the floor. But he placed his hand on the couch and found it warm from their bodies. Therefore, he gave them another whipping.

The third night, returning earlier than usual, he found the dogs sitting before the couch, blowing on it to cool it.

CHILD REASONING

Mother—"Johnny, why are you staring at the minister?"

Johnny—"Waitin' to see him eat his head off like you said he would."

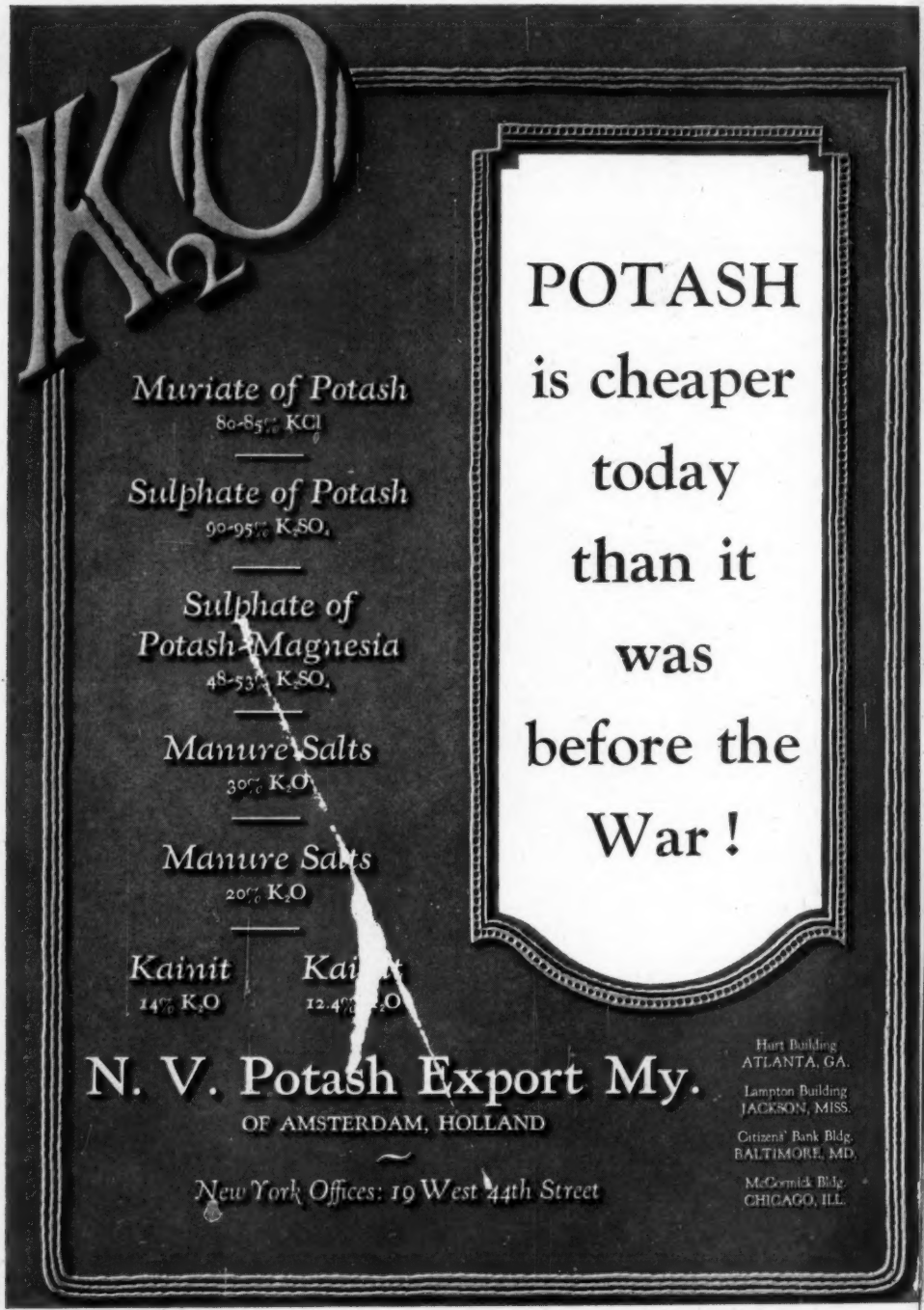
Two colored men came to the outside of a crowd where a politician was making a speech. "Who am dat man, Sam?" asked one.

"Ah doan' know what his name is," Sam replied, "but he sure do reccommen' hisself mos' highly."

SPIRIT WAS WILLING

Mrs. Newly: "We are having a few friends with us for a musical evening tonight, Bridget, and I'd like you to do your best."

Her Cook: "Sure, mum, I haven't sung for years, but you can put me down for "Come Into the Garden, Maud."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Sulphate of Potash
90-95% K_2SO_4
Sulphate of Potash-Magnesia
48-53% K_2SO_4
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